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Canada - Conferences

Arctic Transportation Conference
Yellowknife, N. W. T. 1976

Proceedings

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PROCEEDINGS
OF THE
ARCTIC TRANSPORTATION CONFERENCE
YELLOWKNIFE, N.W.T.
DECEMBER 8 & 9, 1970
SPONSORED
BY THE
MINISTRY OF TRANSPORT
AND THE
DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT
VOLUME - 1
(English Version)

CONFERENCE CO-CHAIRMEN: Hon. Jean Chrétien, P.C., M.P.
Hon. Don Jamieson, P.C., M.P.

Ottawa, Ontario
published February 1, 1971.



Thirty-four background papers were prepared to provide a body of information and reference material in advance of the discussions at the 1970 Arctic Transportation Conference in Yellowknife NWT, December 8 & 9 1970. This collection of papers as well as other papers presented at the conference are published in volumes 2 and 3 of the proceedings.

Volume 1 contains the proceedings of the opening, second and the final plenary sessions. Volume 1 also contains the speeches at the Conference banquet, a short summary of all papers presented, biographical sketches of panel members, a list of delegates and discussions at all sessions. Generally speaking, discussion is reported verbatim but in several instances there have been minor alterations and deletions for the sake of brevity and clarity and because of recording difficulties. Papers given by government employees did not represent official policy but were prepared to further discussion of different courses of planning and action.

FOREWORD

THE THEME:

"ARCTIC TRANSPORT IN THE 1970's"

Transportation plays a crucial role in the development of a country. The building of the CPR helped unite Canada. What this generation does in the Arctic can have equally important and long-lasting results. Our objective is a transportation system that contributes to the orderly social and economic development of the area, compatible with the protection of the environment.

The many agencies, commercial interests and general users of transportation services will have a major part to play in helping achieve this objective. Previously, these interested parties had little opportunity for coordinated discussion of their problems. The Arctic Transportation Conference in Yellowknife December 8 and 9, 1970 was held to provide this opportunity.

In presenting this record of the Yellowknife Conference, the Ministry of Transport and the Department of Indian Affairs and Northern Development wish to express their joint appreciation of the work contributed by all concerned.

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VOLUME 1

SECTION 1 - GENERAL OPENING SESSION

CHAIRMEN: Hon. Jean Chrétien

Hon. Don Jamieson

WELCOME ADDRESS: S. M. Hodgson

"There are two kinds of Arctic Problems, the imaginary and the real. Of the two the imaginary are the more real: for man finds it easier to change the face of nature than to change his own mind."

Vilhjalmur Stefansson.

OPENING WELCOME

Address by: S.M. Hodgson
Commissioner of the Northwest Territories

When one looks back over the years, I think that we realize the hardships that the Eskimos, Indians and early Explorers who first came to this land faced. The harshness of the land was unbelievable and their only means of transportation which was then limited to dog teams was at times slow and labourious.

I suppose if you travel this part of northern Canada you can't help but marvel at these people no matter where they came from or whoever they were that they were able to come in and around this part of the world to map and push back the frontiers and return back from where they came. They all made a major contribution in their own way to learning more of our Canadian Arctic and pushing back what is now called the last frontier. Much has happened since that time and modern transportation has certainly come to the Canadian Arctic. It is not uncommon these days to see jet equipment flying, if not into, at least over many of the smaller settlements but serving many of the larger settlements in the east as well as in the west.

Last week as a guest of the Minister of Transport I went on a trip to Churchill along with Mr. Storrs for a visit to the St. Laurent, which was berthed just outside of Churchill. This was the first time that a ship had ever been in the Churchill area this late in the season. Then we see the huge transport trucks that are now rolling into the North during the winter as well as the summer and of course the motor toboggans dot the landscape in any community that you may visit in this part of our country. All

OPENING SESSION

of these are modern marvels of technology and all of these are aiding greatly in opening up this part of Canada as well as serving the people who call the Northwest Territories home. I believe that all of these are helping to turn back and pull back the curtain of mystery that has shrouded northern Canada for so many years, and it seems to me that conferences such as this kind add immensely to both the knowledge and the solutions as to how to tackle these problems.

I know that it is fashionable these days to hold conferences to talk about problems and judging from the determination that has been put to organizing this conference by the Hon. Jean Chrétien and his department and the Hon. Don Jamieson and his department plus the many expert people that are here at this conference today that this will be a conference of solutions. I want to congratulate the Ministers for holding this conference. I believe it is a fitting way of bringing to a close Century I in the development of the Northwest Territories. This is the last large event of this kind that will be held in the North during this our centennial year, and I can't think of a better way of moving into the second century than moving in with the confidence that you people and the interest that you people have shown in making your contribution to rolling back the last frontier of North America. It is my privilege now to call on the Minister of Indian Affairs and Northern Development, the Hon. Jean Chrétien.

OPENING ADDRESS BY: THE HON. JEAN CHRETIEN
MINISTER OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

Mr. Commissioner, Mr. Minister, Ladies and Gentlemen.

It is for me a great pleasure to be at this Conference this morning, and I would like to thank you for your interest in coming in such great numbers. It is for my colleague Mr. Jamieson and me a great rewarding morning to see that this Conference, a very important conference as Mr. Hodgson said for this second century of the Northwest Territories, is so well attended.

The North is now at a critical point in its development. The next ten years will require decisions which cannot be postponed and which will shape its future to a great extent. Many of these decisions once made will be irreversible. All of them will have to relate to the kind of development Canadians and northern residents, particularly, require for the North. People active in highly technical fields such as transportation will need to maintain close and continuous dialogue with the people directly concerned and with those engaged in the fields of political, economic and social development.

Perhaps I could put this even more vigorously. Unless transportation economics is fully responsive to broad economic and social needs, development can be thwarted, and desirable ends may not be achieved.

The role of my Department is quite different from that of the more technical departments, although we have specialists too. Our primary role is to ensure that decisions based on the

OPENING ADDRESS

various technical requirements fit into a broader framework of objectives for the North - a framework derived from Canadian aspirations about the North.

Such objectives must reflect the needs of native northerners and give them a place in the scheme of things and the shape of things to come. They must take the entire northern milieu into account. They must consider the wildlife resource, the land, the water and most important of all - the people. The development and utilization of resources - whether they be human, renewable or non-renewable, is dependent upon adequate transportation. At this conference you will be hearing papers which pose vital questions for northern transportation. I know that you will bear in mind throughout the discussion that questions relating to transportation are not in themselves complete questions. They are but one segment - often a highly significant segment - but still just a part of much larger questions.

I would stress particularly that no northern planning can be satisfactory unless it takes the northern community into account. I know you will bear this in mind in your discussions. The people as individuals, their communities, their councils, organization and their Territorial Government all have roles and have the right to be heard about northern development. We must establish a real dialogue.

OPENING ADDRESS

Transportation is one of the great factors in shaping a society. Roads and railways, airports and terminal facilities, shipping lanes and waterways mould and shape the lives of those they serve. Their evolution must take into account the ways in which people are willing to adapt, are willing to be moulded, society will also have a hand in shaping transportation. Indeed, if this does not happen we shall have a heavy investment in facilities which defeat their own purposes. Transportation is the key to one kind of mobility. Mobility of another kind is the key to employment. Of course there is a difference between the kinds of mobility. One is an ability to exchange one career for another, to adapt to a different culture, to change one set of skills for another. The other is simply being able to get from one place to another - to drive along a road.

Today many native northerners have neither kind of mobility. While we are moulding and building an educational system to make good one defect, we are also building roads to make good the other.

ROADS

You will be discussing the future road network of the North. You will be asking yourselves what criteria should be used for planning future roads. You will be thinking about weight limits and the transportation needs of the communities which roads serve.

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Questions will arise about the merits of allocating funds for paving - with possible reductions in load limits on some roads. You will be faced with questions about the effect of roads on the ecology. You will be considering the effects of off-road ground transportation.

We have given a priority to the Dempster Highway to provide an all weather road to the Mackenzie Delta and plan to have it completed by 1974. This will provide a land connection to one of the most densely populated of the Arctic regions.

In my view it is the most urgent road building task in the North. You may have different ideas and reasons to support them. I would like to hear your ideas, although in this instance I have strong views of my own.

I hope that when you bring your experiences to bear on these matters you will consider the priorities within the northern community, the priorities of the resource utilization industries, the priorities of the ecology and will take into account the available finances.

Closely linked to roads in the North is the matter of water transport on the inland waterways. Here again priorities must be based on sound criteria. How much should be spent on channel deepening and how much on roads to replace our dependence on the water routes?

PIPELINES

The two panels this afternoon are closely related to

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one another. If an oil or gas pipeline is to be built, as seems likely, the question will inevitably arise of road or water transportation to supply the construction crews and of road access for servicing.

Such a pipeline would be built, as Mr. Greene and I have announced, within a designated corridor and the decision as to where this corridor is to be located is one which will have a bearing on the supply route to be used.

Tomorrow there will be a panel, "Transportation: People and the Environment". This has a close connection with pipeline route decisions.

The selection of a pipeline route will be one where northern needs must be carefully considered. Game migration routes and habits and ecological protection as well as technical problems will all be major considerations in the choice of where the route will lie and how the line could be built.

It has been suggested that an oil pipeline crossing permafrost would break up and spill massive quantities of oil. If that were a live possibility, I don't think the money could be found to finance the line at all. The question is what sort of protection will the line have to have to meet the climatic and ground conditions and how will such a line affect the land through which it passes.

The North is not a place where drainage can be disturbed without facing consequences. The North is not to be

OPENING ADDRESS

tampered with lightly by pipeliners who do not want to face a billion dollar white elephant. But the technical problems can be overcome and the line can be built. Research will lead us to the required solutions. The problem we face is to make sure the right research is done well ahead of construction so that answers are available to meet all the problems. I hope you will be suggesting lines of research to meet these needs.

PEOPLE AND THE ENVIRONMENT

I am looking forward to stimulating panel discussions. It seems to me that we face a critical question of balanced objectives whenever we discuss things which affect the people of the North or the environment.

The northern environment is not that of the South and operations here must take this into account. We do not propose to allow the North to be destroyed for the sake of its resources. We believe that the precautions we are now taking will ensure that there is a compatibility between development and conservation - that we can in fact reconcile both these basic needs.

You will be asked to consider some of the questions which are raised by the differences of the northern milieu, by the needs of the native peoples and to suggest some answers where these are possible, some productive research where answers are not yet known.

USER CHARGES

Another panel tomorrow morning discusses user charges

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for transportation facilities. The cost of living in the North reflects some aspects of user charges which are unpleasant to live with. How far should we go in subsidizing living costs for individuals and communities? Over what tax base should costs be spread? To date we have recognized that the first developers in remote areas should not bear all the infrastructural costs; to what extent should this policy be continued, and at what point should users be expected to meet full costs? The answers do not depend simply on economic feasibility at the time but on taking an imaginative approach in which the future potential is assessed and decision based on future expectations and the developmental needs of the North.

RAILWAYS

Such matters lie at the heart of the ensuing panel on northern railways. Should we build railways before they are clearly economic? What should our policy be in regard to development railways and such potential future transportation facilities as solids pipelines?

Most of us, I am sure, would see a pipeline as necessarily meeting its costs from the product shipped. Are railways so different? Perhaps there is a case for a railway as a developing agent, one which opens country up before the resource opportunities have been identified.

Such a policy paid off for Canada when the CPR was built, but we had later and different experiences with other

OPENING ADDRESS

railways. However, the success of the Great Slave Lake Railway and other resource railways leads me to hope that further expansions in the North will not be too far in the future. Your views on these matters will be of interest to those who must make the decisions on such proposals and have a direct bearing on the situation in the Yukon.

YUKON

Alternative transportation facilities for the Yukon are in the forefront of northern development proposals. The Canadian Northwest Transportation Study will provide some interesting facts on which we can focus our judgments. In the final analysis it is the criteria for making those judgements which are going to determine the ultimate decisions. Your views on what those criteria should be will emerge from these questions.

AIR

The final panel tomorrow is on air transportation. The airways have been the catalyst in the North. Without the airplane the North as we know it today could not exist. This is one part of the world where the airplane is the most important single transportation facility for most purposes.

If it is true - and I think it is - that our societies are shaped by means of transportation available to them, then the airplane is one of the great factors in the future of the North and the role of the air carrier is crucial.

Air freight, future schedule routes, new designs of

aircraft, the impact of STOL aircraft are matters which will have a powerful impact on northern life.

Here again we must not lose sight of the social impact of decisions made for technical reasons. Aircraft have such a direct impact on the lives of northerners that vital decisions affecting them cannot be made on purely technical grounds.

It is up to those of you who have concerns about northern life to bring them forward at this panel and so stimulate the technicians into looking at non-technical considerations.

The agenda is heavy. Your panels will delve into the most complex issues in northern development. But our future transportation system will be built on a sound base.

THE FUTURE

I want to be careful to say that the present transportation system of the North is good in relation to the numbers served and the area to be served. Your discussions will bear upon the future and how we can meet its demands. I shall be greatly interested in the views you put forward. As I said at the outset of my talk, the decisions to be made now are critical for northern development.

The North is at a take-off point and the future direction will be set by what we do in the next few years.

May your arguments be strong and well founded and may they lead us all to a better understanding of the needs of a future which will test us all.

VOLUME 1SECTION 2 - TRANSPORTATION AND THE ARCTIC COMMUNITY

CHAIRMAN: Mr. Robert J. Orange

SPEAKERS: Mr. James Smith

Mr. Abraham Okpik

Mr. Ray Anderson

"I speak of Arctic travel
as I find it."

Abraham Okpik.

TRANSPORTATION AND THE ARTIC COMMUNITY

Address by: Mr. Robert J. Orange, M.P.

In the course of a conference in the Canadian North on a subject such as transportation, I believe we will find all participants in favour of improving the existing situation. Probably no other part of Canada is so completely dependent for its total existence on two particular forms of transportation, water and air. These two resisted for a long time man's invasion into these parts; however, as technology improved, the resistance lessened and, with the lessening of resistance, came the impact of change and development on both the people and the land.

The story of transportation in the Canadian North is well known to most of you here today. During the course of this Conference, we hope to hear something of past experiences which are being used to develop future approaches in all fields of transportation.

In the short time that I have been associated with the North, I have had the experience of relying on the annual sea lift for the bulk of our food supplies, of seeing the regional airlines grow from the DC-3 to the 737, and of the re-supply of some communities totally by air.

Now we are at the stage where there is an ever-increasing volume of supplies coming into the Canadian North and we know we are on the threshold of major developments which will touch on all our lives and, hopefully, will see this country participate much more strongly in the Canadian Confederation.

TRANSPORTATION AND THE ARCTIC COMMUNITY

I want to congratulate the Minister of Transport and the Ministry of Transport for organizing this Conference. I believe the Minister is giving leadership which, in the past, many of us in the North may have felt has been lacking with respect to previous Ministers. This Conference is an illustration of his concern for new approaches, as is the Minister's stated plan to create an Arctic Transportation Administration as a major component of the Ministry of Transport.

It is my understanding, and I expect we will hear more about this from the Honourable Mr. Jamieson during the Conference, that this Arctic Transportation Administration will bring together under one roof all of those separate and varied units that now deal with transportation in the North, in an attempt to prepare the total transportation package to meet the needs during the balance of this century. As well, it is hoped that the Arctic unit will be headquartered in the North.

It is the view of many of us who live in the North, that too often in the past, the plans, policies and programmes of a Department the size of the Ministry of Transport were not responsive to the changing needs of Northern communities; that much of the service provided in the form of new installations and new facilities was based on the requirements of the Department to fill their programmes rather than to meet the needs of these communities. Added to this, the fact that regional headquarters responsible for administering the Ministry of

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Transport programmes were located from Newfoundland to British Columbia, made it almost impossible to co-ordinate and rationalize development programmes.

When we examine what has been done in the past, and it is not inconsiderable, and I will not accuse the Department of failing to spend money in the North, I must say that a true Northern transportation concept has never been formulated. Whatever attempt has been made to fill the gaps of navigation aids and weather reporting in the Central Arctic, whatever attempt has been made to develop air strips in every community, while not necessarily meeting standards in the South, will provide an essential life-line to a community.

In the past, other Government Departments or the Governments of the Northwest Territories and Yukon Territory, have tried to fill the void by disguising such projects as fire breaks and access roads. What attempt has been made to insure that a consistent standard of docks and wharves in those Arctic communities which are almost totally dependent on the sea for a vast majority of their supplies?

While it is easy for all of us to look to the sins of the past, I believe that under this new format, we have reached a plateau and will now move forward to better things. Even in saying this, I believe I should express some concern regarding the importance of Federal Government agencies co-ordinating their activities and requirements in order that the best possible

TRANSPORTATION AND THE ARCTIC COMMUNITY

service may be provided to the people of the North and to insure orderly development in this country.

The Arctic community faces high costs, inconsistent services, and goods arriving in damaged condition many times. A conference carrying the name "Arctic Transportation Conference" must direct itself not only to technological improvements and changes, but also must examine such features as the equalization with southern Canada of transportation costs. A conference must examine the views and needs of the indigenous peoples of the North. Policies, plans and programmes must take into account the people as well as economic and resource development. In the rationalization of transportation there must be a blending of the private sector with the public sector taking into account the nature of Canada and the importance of the private enterpriser in our society. There are many people attending this Conference who are established experts in their own field. There are many who have a great knowledge of the North and the means of servicing it best. The Conference will be an opportunity to exchange ideas, to obtain new information and, for the future, to develop new approaches to transportation throughout the vast Canadian northland both in the northern parts of the Provinces and in the two Territories. We look to this Conference to have a significant effect on the quality of life in the Canadian North.

Just 100 years ago, a great Canadian had a vision of a

Canada stretching from sea to sea. Sir John A. MacDonald, having achieved the first stages of Confederation, looked to build the nation we now know as Canada. Against the advice of many politicians of the day, and most economists, he insisted on building a railroad across Canada in order to link the communities of the east and the west.

It was thanks to his vision and determination that this great nation touches on the Atlantic and the Pacific.

Maybe the challenge of the 1970's for Canada is really not much different except that now, instead of running from east to west, it is from north to south.

TRANSPORTATION AND THE ARCTIC COMMUNITY

Address by: Mr. James Smith
Commissioner of the Yukon Territory,

In congratulating the two Ministers involved in this Conference on their opening remarks, I join with them in appreciation of those whose concern for the Canadian North has brought them here to talk about our problems in transportation and communication.

Conferences on Northern Development have been a feature of our life in the past year or two - both at Yellowknife and Whitehorse - and I have no doubt that much good results even when shortcomings are revealed. There have been great changes in our way of life and in our attitudes. Not so long ago the long severe winters, the lack of facilities which people elsewhere take for granted and the inevitable restrictions on family life, were enough to make some people wonder whether it really was worth while. Times are now rather different and those who might have wished to give the country back to its original inhabitants are beginning to think again; as the Indians are themselves more interested in the North perhaps this is one of the reasons we are here at this Conference.

Another aspect of the North, seldom mentioned perhaps, is that hardly any books on the subject are based on long experience. Our whole history is based on visits from people who come here for a year or two at the most before going home to write about it. To such writers the North is always hostile, a terrible environment in which life is next door to impossible,

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and nothing can be done about it. All of a sudden, even in the last six or seven months, changes are coming about in these attitudes, and some people are even talking about the 'tender tundra'; what a change!

The fact is that nowadays the North is no more hostile than the Sahara but equally so the tundra is neither more nor less tender than elsewhere. No matter where we are, be it North or South America, in the temperate zone or in the Arctic, we must pay due attention to our environment.

Transportation is a central process of life in all Canada, and is more important in the North than elsewhere because here it is undeveloped and our entire future depends on it. But, as in other parts of Canada, Arctic transportation must be designed to meet the specific needs of the case which are just as varied as anywhere else. It is quite unrealistic to apply a uniform policy to transportation in the entire area north of the sixtieth parallel of latitude, and this imaginary line, which has the advantage of simplicity when drawn on the map of Canada, is inadequate as a boundary line for planning and development. The Arctic is not a homogeneous region and we must define areas within the North which might be susceptible to a common approach. In my view there are at least two distinct regions which must be considered.

In discussing these regions, I would again emphasize what both Ministers have already said at this meeting - that

TRANSPORTATION AND THE ARCTIC COMMUNITY

the main deficiency of government policy in this business of Arctic transportation lies in the absence of an effective and co-ordinated approach by the various departments of government and industry who are necessarily involved.

The first of these regions might be called the Northwest District; it would comprise the Yukon and the District of Mackenzie, an area which has been well researched industrially on which information now exists, and from which we must move out minerals to the world market. If we fail in this, or if we are too slow, there will be little prospect of generating profitable business before competition cuts in from elsewhere and our hard-won markets are lost.

My second region of the North would comprise the entire area east of the Mackenzie, and the islands of the Arctic. The transportation needs of this region are not entirely based on its potential to live on an economy built on non-renewable resources. The transportation policy of this region should be designed to bind the isolated communities of the Arctic in a common opportunity to share in economic and social benefits available to all in other parts of Canada. In comparison with the Northwest region, the problem here is human rather than technical.

Now that we have defined the areas of operation, we come to the problem of strategy in our transportation policy - what kinds and modes of transport do we need? A recent announce-

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ment by my Minister on the speeding up of construction of the Dempster Highway, to Fort McPherson for the connecting link of Inuvik and beyond, is a significant development in transportation history in this part of Canada. In the Yukon Territory the road network exceeds 2,500 miles, and our views on this means of communication are best summed up in the words of an article which appeared recently in the Alaska Conservation Review, as follows:

"No matter how dusty, rutted, frost-heated, seasonal, twisting, narrow or snow-choked, every foot of our 2,500 miles of road is a glowing ember to warm our hearts."

Make no mistake about it, to anyone who has ever lived in a small community in northern Canada, life and death - and everything in between - is based on the efficiency of the transport system by which all supplies must come. There is no substitute for a road in our part of the Canadian North. Our economy is based on resources which we must export; we simply must have an efficient system of transportation so that our products can compete in world markets and our inbound supplies can sustain our economy at a reasonable cost.

The modes of transport necessary for such a system will form a subject open for discussion by this panel today. There are four different kinds of transport which may be used to reach national and international markets from the Canadian Arctic - surface vessels on water, unitrain on land, air freight, and various forms of highway and off-highway trucks.

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Now for some particular comments; it seems a lot easier to invest several million dollars in a road, with the hope that traffic will then develop, than to invest several thousand dollars in an airstrip under the same conditions. Many of our roads in the North have been built with hopes of subsequent development, hopes which have fortunately come to pass. But we have to be flexible in our approach to these problems, and the argument that a minimum road system is needed depends on what is minimum. For example, insufficient recognition is sometimes given to our ability to build roads quickly, as in one case of the road from Watson Lake to Canada Tungsten Mine which, by working from both ends simultaneously and using aerial reconnaissance, was completed in two construction seasons. One problem here is that Canada Tungsten Mine is in the Northwest Territories and the supply road goes through the Yukon, so that we in the Yukon wonder whether we get enough taxation benefit to justify keeping the road open. Perhaps this might be another argument for extending the boundaries of the Yukon to include the Mackenzie District!

To sum up, I might emphasize that transportation is good only to the extent that people can afford to use it. Not long ago the Whitehorse television screens carried an advertisement in which an air carrier advertised a round trip from Vancouver to San Francisco, complete with stopover, for \$83. Now of course I realize that this was intended for Vancouver

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audiences but, even so, viewers in Whitehorse could reflect cynically that the same airline will take them the same distance but from Whitehorse to Vancouver, and one way only, for exactly the same fare - \$83.

From this kind of situation, and many similar, we see the basic problem with Arctic transportation. How can our community survive in the face of this heavy burden of cost as compared with society elsewhere? I might also say that the problem is not entirely one of finding and developing, and transporting, our products. A major difficulty at the present time is that of recruitment and retention of our labour force. In this connection I should emphasize that our native people must be able to make their contribution to our working population, and to share in the fruits of our economy. For this to come about we must have a system of transportation which bears some kind of reasonable comparison, particularly as regards cost, with equivalent moving of weights over the same distance in other parts of Canada. Until this equality has a real meaning, and until we do have such a system of transportation there is no point in us taking the attitude of a knight on a white charger, as some of us in government are apt to do; the building of roads and airfields, more or less at random and apparently just for the sake of building them, or for the sake of satisfying some particular need without thought for its place in the entire economy of the Canadian North, is not going

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to bring about the equality of which I speak. From the individual point of view, as with individuals everywhere, the question asked is more likely to concern his pay cheque; this is the real equality - when he and his family have satisfied their immediate necessities, how much is left for enjoyment of a normal life when compared with his counterpart elsewhere in Canada?

I believe that this is the basic question. The answer, as most of us know, lies in the development of our transportation.

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Address by: Mr. Abraham Okpik

Mr. Okpik was introduced by Bud Orange M.P. Mr. Orange recalled that Abe Okpik, now Area Administrator for the Government of the N.W.T. at Pangnirtung, Baffin Island, came from the Mackenzie Delta. Commencing a distinguished career of public service as a translator of the Eskimo language at Ottawa in 1956 Mr. Okpik served at Frobisher Bay for five years before taking on additional responsibilities at Yellowknife. He was then appointed a Member of the N.W.T. Council, served for one term, and subsequently became Area Administrator at Spence Bay. Mr. Okpik is now engaged on an interesting and unique project, which has been running for a year or so, called 'Operation Surname'.

Mr. Okpik:

I must take this opportunity to thank those who asked me to speak on some of the experiences and problems which arose when I travelled in the Arctic on Operation Surname.

First let me describe this operation which involves travelling to every Eskimo community. The purpose of the project is to eliminate disc numbers and to give a surname to every Eskimo. To carry out this scheme I have to hold personal interviews in every Eskimo community. When you talk about numbers you may think of social insurance numbers, or something of the kind, but when an Eskimo thinks of a number he means something totally outside your experience - identification by number and one given name.

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When I was asked to speak at this Conference, it occurred to me at once that my experiences of travelling and transportation in connection with Operation Surname would be very close to the theme we are now discussing, for my first thought when I was assigned to this task in August 1969 was 'How can I possibly visit every settlement to interview everybody, and how long will it take to finish the work in a reasonable time and at reasonable cost?' Since then much of the problem has been solved, and in fact I have travelled extensively throughout the Arctic, mostly by air but also by other means. Let me first speak about air travel in the Arctic.

I found that scheduled airlines usually provide weekly or bi-weekly service. It is anything but easy to link one route with another or to get from one system to another; to reach the District of Keewatin I had to fly south to Edmonton and Winnipeg, and then back to Winnipeg and across to Montreal simply to get eastwards to Baffin. Coming back, it was just as difficult, for I had to take a plane for Montreal before I could move across to the Belcher Islands at the very bottom of Hudson Bay.

Some isolated settlements of course cannot be reached by aircraft, or for that matter by boat, at certain times of the year, but even so I am principally concerned with air travel and I usually spend a week or more in each community before moving on to the next. With this very strong interest in the

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availability of aircraft, I have found that it is usually not the actual airplane, but more often the weather, and the reporting of weather by radio, which is the limiting factor. Without radio I am sure that the R.C.M.P. Detachments in the Hudson Bay area, and for that matter the R.C. Missions, would never receive a single aircraft if the pilot had no way of knowing what the weather was like on the way, and indeed if he had any chance of getting to a safe landing; good and prompt weather information is absolutely essential in air travel.

Sometimes in bad weather there is a radio blackout which may last for quite a long time, and I have often waited ten or even fifteen days to get out. When this happens I think of the trappers who just have to wait with patience, for there is no other way. It's not good, but there it is.

Now I must say a word or two about ground travel. Surprisingly enough, there is great mobility among the settlements by this means. From Gjoa Haven people will travel to Spence Bay or Pelly Bay, thence to Repulse Bay, up the Melville Peninsula to Igloolik, across to Arctic Bay in northern Baffin and Pond Inlet, and then down the coast of the Davis Strait to Clyde River, Broughton and Frobisher before finishing at Lake Harbour or Cape Dorset in the Hudson Strait. Travel of this kind starts about the month of March and ends in June.

Sometimes when I came to a settlement I found that I had just missed a family whom I particularly wanted to see,

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because they had taken off for Clyde River or somewhere equally far away. When I asked "and how did they do that?" the reply given with unconcern I may say, would be "oh just by skidoo!"

Travelling by skidoo, it usually takes no more than two or three days at most between settlements, and weather does not delay the travellers who know the route well and can operate without weather reports. By this means people move from community to community, travelling great distances, without anyone in the South knowing anything about it. No-one questions this of course, but equally so no-one thinks it worthy of notice except as a personal and private matter of no special interest to anyone but themselves. As old-timers might say, "...we are just mystic for awhile."

These are the things I found in my travels, and these are the problems of most people who must travel from one settlement to another. I know of course that many people travel by chartered aircraft, but this I was unable to do. I speak of Arctic travel as I find it.

Note: A summary of the above address then followed in the Eskimo language. In this, Mr. Okpik stressed the question of weather reports and the anxiety of those who wait patiently, sometimes for days, with uncertain knowledge on the arrival of the plane for which all were hoping.

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Address by: Mr. Ray Anderson

Thank you for inviting me to join this Conference. Having been in the transportation business since first coming to the Northwest Territories in 1962, when I formed our Company at Norman Wells, I share your interest in the subject.

The original inhabitants of the North were themselves transients but, as Mr. Okpik has pointed out, they had great patience in hunting and travelling in search of their staple requirements. Unfortunately we newcomers do not have the same patience, we cannot rely on the resources of the land, and we place a heavy demand on commodities which belong to our former upbringing in the South. Not only is our patience short and our demand long, but the routes of supply are hazardous; all of these factors make northern transportation a costly business.

This is particularly evident at Inuvik, my home town, where transportation costs are most definitely pushing up the price of foodstuffs, the price of housing, and the price of utilities in general. This, then, is the position of the consumer. But our difficulties in the role of supplier are equally as bad, and both consumer and supplier suffer from the problem of damage of goods in transit. We are a long way from our sources of supply, and when our customers complain of damage we know that our goods have been humped from one train to another at Edmonton, from this train to boat or plane for Inuvik, and eventually from local warehouse by truck to our

customer. We are a long way from our sources, freight is many times transhipped, all of which increases the cost, both in money and inconvenience and damage, to the consumer.

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SESSION DISCUSSION

CHAIRMAN: Mr. R. J. Orange

We would like, as a panel, to hear some of your ideas and thoughts. Maybe you have some questions on what has been said here or some suggestions on where we should go. The floor is now open.

DELEGATE: Mr. O. Watsyk (Fort Simpson Hamlet Council)

I come from Fort Simpson which is a traditional native community which has experienced many changes in the last ten years. Because of transportation and the arrival of people from the south, the native is almost in a minority. The question now arises, can a native become involved in the economy of the country at all levels, or must he be content to remain at the lowest?

Our secretary manager, Nick Sebiston, is a native who has had university education and who holds that the native should be involved, not only at the lowest level of our economy as a labourer, but also in commerce, planning, management and finance. I agree with Nick Sebiston, for the native people have long experience of life in the North and, although they do not as yet have experience in sophisticated techniques, they do have an immense potential for making a contribution at all levels. I would like to know what others think.

Mr. R.J. Orange:-Thank you very much, Mr. Watsyk. I wonder if Jimmy Smith would like to comment first on this.

PANELIST: Mr. James Smith

There is one basic tenet of northern development; the people who are indigenous to the area must be involved. The minute they are able to transport themselves by some means other than the traditional methods of dog-team or canoe, they become involved automatically. When a road or an airport is put into their village, they cannot simply be allowed to move off to another place and get on with the business of living in the old way. Their situation must be seen as our own once was - when sophisticated techniques came to other parts of Canada, we were given the opportunity to open new doors. These doors must now be opened here, and this must become basic policy. If the view is taken that this need only imply that the native become part of the labour force at lowest level, then I disagree because most of our labour in Northern Canada has to be highly trained. We have sophisticated machinery and our production methods are those of the twentieth century updated to 1970. So from my position, the native is just as adept at making his contribution at all levels as anyone else, perhaps more so, for he is happy to be here. Southerners have to have a trip outside every year, and negotiations now going on make me think that soon it will be once a month. This will eventually mean twelve or thirteen crews instead of one. This is where the native fits in, where he must be able to fit in, which is at all levels of the productive end of society in the North. But this is a

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white man's point of view, my own opinion. Perhaps Mr. Okpik has something to say about it.

PANELIST: Mr. Abe Okpik

This business of our northern population working in the labour force is sometimes hard to understand. When you come in from the South, perhaps as a construction worker, you have a plan and you know what to do. Our plans are sometimes rather different.

I recall being in a settlement where contractors from the South had employed all the native Eskimos. Every now and again, one of the foremen would find a man missing, and he would be told that the Eskimo had indeed gone away hunting again. When I got there I found out that the local Hudson Bay store had run out of food and that the only way for an Eskimo to keep from starving was to hunt, as he always had done. Now when the construction worker from the South runs out of food, more is flown in. But the Eskimo who works with him, and who is his equal during the day, is told that he cannot get food because the ship has not arrived, and he has no option but to get food in his traditional way - food which the white man cannot eat.

The Eskimo cannot understand the attitude that says, in effect, if he is unable to show up for one day then, automatically, he is good for nothing. I know this does not happen everywhere, but I saw it take place this summer when

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travelling in the Eastern Arctic. It is really but another aspect of the transportation and distribution problem.

DELEGATE: Mr. J.B.W. LeClerc (Admin., Cdn. Surface Trans. Admin.
Ottawa)

I would like to hear more from Mr. Okpik about the movement of people in the North by means of skidoo or snowmobiles. From the lengthy trips he has made I feel sure he could comment on such matters as maintenance and gasoline supplies.

PANELIST: Mr. Abe Okpik

I found that Eskimos travelling in this way can sometimes take enough gas to cover the journey but if not they leave a cache in one area, building it up sufficiently by repeated journeys to enable them to make the next stage. This is very often done by pooling resources and using two snowmobiles or vehicles. It is quite common to see this; one morning perhaps two skidoos will appear far out in the bay, perhaps towing a sleigh, and you find that they have just arrived from Clyde River perhaps, and when you ask how long it took, they will tell you only a day or two from Clyde River. This type of transportation is something that most people are quite unaware of. Even in my case, travelling from settlement

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to settlement as I did, I could have saved on my travel budget by this means instead of having to wait so long and so often for an aircraft which we could see overhead but was unable to land.

DELEGATE: Mr. Harry Wolfe - (Regional Supply Officer-Frobisher Bay)

I share the concern of other speakers about the natives of the North. I am the regional supply officer at Frobisher Bay and can give you examples of the cost of living there. We pay \$1.38 for a dozen eggs, 85 or 95 cents for a quart of milk. My salary allows this because there are certain extra allowances included, and in other cases people in somewhat similar positions elsewhere live out of cans or departmental rations, so that, in effect, all these people are on a subsidized cost of living.

On top of this, from the point of view of the native inhabitants, we are transients, and we always will be transients. But in Frobisher Bay the population is at least fifty per cent Eskimo who have no such subsidy and live on welfare. Most of them receive salaries far below the average civil servant who has a glamorous food store in which he can forget, for the moment, that he is in the North until he looks at the price tag.

Very few Eskimos are there filling up their shopping carts and, in a sense, I suppose that nobody at all is walking out with the heaped carts so common at Steinbergs or Dominion Stores. My point is this - if we want people to stay in the

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North, particularly in the Eastern Arctic, and if we want ordinary residents as well as civil servants to buy a house, is thought being given to subsidizing the cost of freight on foods for all, rather than subsidizing the one half of the population who are civil servants while completely neglecting the other half?

The other half live there all the time, and they have to watch others buying goods which they themselves cannot afford. Frozen foods are flown in at exorbitant prices, and many of the permanent residents would like to eat them too; but, I can assure you, when the produce eventually arrives, there are many who choke on every carrot they eat when they think of the price!

Mr. R.J. Orange:-Thank you very much Harry. I think you have touched on two very sensitive points that bother a lot of northern residents. That is the fact that by and large the person that comes from the south be he government or be he working for private enterprise in a major company is in some form subsidized in his living costs whereas the original people of the North by and large must make their own way with all of the high costs. This is one of the areas, in the development of a total transportation package that must be given serious consideration to see what means can be developed in order to make the North more attractive to all of the people who live in the North. I do not know whether any of the other panelists have any other comments on this. Maybe you have Ray because you're affected in the Mackenzie Delta.

PANELIST: Mr. Ray Anderson

While appreciating the high cost of living in the Arctic, for there is a similar situation at Inuvik, the question remains as to how the problem can be solved.

As a non-government resident I would like to think that the subsidy on the one half of the population should be removed, that is on the government employee half, rather than adding a subsidy to my half to balance my position comparably. This is possible, given the right perspective, but people have to realize that it is possible.

If the developers of the North are going to reap a large profit, then there should be a profit to those who go there. While that is entirely true, I must also say that because it is expensive for us to live there I would much prefer to see higher wages, rather than outright subsidy, so that all can pay realistically for their goods and services. Summing up, I do not like subsidies - I think they throw things out of a proper perspective.

Mr. R.J. Orange:-I see Don Watson at the back there who's just itching to get up here.

DELEGATE: Mr. D.N. Watson - (President, Pacific Western Airlines,
Vancouver)

Having heard the speaker from Frobisher Bay, I must agree that there are problems and disparities, and I agree

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that these are between the native population and those who are sent to the Arctic with certain living allowances.

However, the reflection always appears to be directed at transportation costs, which is where I become interested. In this connection I well remember driving from Inuvik to the airport with the Hon. J.W. Pickersgill, the conversation being the high cost of living. Mr. Pickersgill asked the driver about the cost of eggs at Inuvik -"much the same as at Frobisher I imagine"- and the driver promptly came out with "\$1.25 dozen, terribly high", he said. Well, it is high, particularly as we know that they are shipped from Edmonton at a wholesale price of 55 cents, or even as low as 38 cents. Mr. Pickersgill then asked the driver about why the cost of living was so high. "Oh," he said, "air transportation." All of the high cost of living in the North is invariably attributed to air transportation and, while I said nothing further at the time, I later weighed a dozen eggs in a carton to see what the position really was. The carton of eggs weighed $1\frac{1}{4}$ lbs. Now the freight rate substantially used by merchandisers in the North is 17 cents a lb., and for the sake of argument and simplicity, suppose we call our carton of a dozen eggs two pounds in weight. That would be 34 cents for freight; add this to the probable wholesale price of 38 cents, and where do we get \$1.25? As eggs are shipped in every day, the additional cost is not in warehousing, it is not breakage; where is it?

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Be reasonable. Where does the real cost of living come in? Don't charge it all to air freight. The tendency has been around for years, since the days of the old Norsemen in fact; as it then cost \$1.00 a pound to reach Yellowknife, eggs were probably about \$1.75 a dozen at that time. Plainly this has been reduced, and those days are gone, but despite this we perpetuate the same old fables of the 'thirties and 'forties. That is why it costs us money.

At the risk of offending very good friends and customers, we must stand up and be counted, and we must look to the real source of high cost in the North.

Mr. R.J. Orange:-I wonder if there are any merchants in the hall who would like to stand up and be weighed.

DELEGATE: Mr. G.W. Rowley - (Scientific Advisor, Indian Affairs and Northern Develop., Ottawa)

I would like to point out that expensive transportation does protect the local market. One has only to consider how agriculture in the Arctic has retreated; a hundred years ago there were cows at Churchill but this is no longer economic as transportation has improved and the local market finds it harder to compete.

I think this is true also of the labour market. Every improvement in Northern transportation makes it harder for the Northern people to compete. In saying this I do not advocate

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worse transportation than we have now - but I do want to emphasize some of the effects that go with good transportation.

DELEGATE: Mr. Karl Francis - (Professor, U. of Toronto, Toronto)

I feel it appropriate for me to comment, based on a variety of different kinds of work in the last few years, particularly in the North and Greenland and Alaska.

I am delighted to hear from Mr. Okpik of his experiences of Eskimo travel by skidoo. For years I have been trying to get information on this but little has come to light and there would appear to be no literature on the subject.

This form of travel is tremendously important to Eskimo life and, whether by old means or new, they are a highly mobile people. It is amazing to discover that this fundamental form of life is largely invisible to people from the South, and, as fulfillment of this desire to move from place to place is very important to local people, it should also be an important factor in terms of future planning.

Another, and more subtle aspect, is the use of land; those who use the land may well have some claim on it.

PANELIST: Mr. A. Okpik

Why do people travel? There was a man at Clyde River who had a sister at Broughton Island, and he moved his whole family there for a year, just to be with her. Someone

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else I know left Gjoa Haven for Repulse where he was successfully married. These are the kind of reasons why people travel, in the Arctic as anywhere else.

I remember a person in Arctic Bay who had a brother in Igloolik, who travelled in the way we have been describing. If he had been able to take to air travel he would have gone from Igloolik, on the way back, to Hall Beach, Hall Beach to Frobisher to Resolute, Resolute to Arctic Bay. It would have cost him five or six hundred dollars to take the plane; by skidoo all he needed was the favourable time of the year, two days off his job to travel, and he might well have returned in a week or so.

In my own case I had to get from Pelly Bay to Hall Beach but I found that by air I had to go by Yellowknife, Winnipeg, Montreal and Frobisher, a distance of many times the shortest and direct route. If, on the other hand, I had been given a skidoo, I could have been there, let us say, tomorrow. This is the kind of thing we do not understand, because we are constrained to think in terms of North and South when what we often want is East and West. From the highest hill near Pelly Bay I am sure I could have seen the highest mountain on the other side, where I was really going, and yet I had to go South for all that way before I could get East.

Everyone now moves about the Arctic by this way which has brought a new kind of mobility to life, faster than the old dog-team, easier under modern conditions, but essentially of the

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same order. As with the dog-team, if people are lost nobody ever hears about it at the time; today perhaps such journeys may be mentioned on the radio or in the newspaper, but nobody really worries. The air route seems simple, seems comfortable, seems direct, but in fact it often takes a very long way round.

DELEGATE: Mr. Charles Vuckets - (Chamber of Commerce, Hay River)

In addressing my comment to Mr. Smith, I should explain that I represent the business community of Hay River through the Chamber of Commerce there, and that my transportation background is in voice and data communication.

In opening remarks there was reference to lack of interest on the part of native personnel, a point of view with which I have no wish to argue. But I do take exception to an inference that representatives at this Conference who live and work here, set up in business here and consider themselves as citizens of the North, might not represent their communities because they were not born or raised in this region.

The reference to cost of air transportation from Vancouver to San Francisco as compared with Vancouver to Whitehorse is very good, but it must be obvious that the cost for carrying groups of people is much lower in the high density areas of the South than it is in the North. Mr. Smith, what do you think is the solution to this disparity which affects, not only air transportation, but other forms of business who

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must operate in these Territories?

PANELIST: Mr. James Smith

I'm sure that a question of this magnitude is beyond simple solution. We must recognize that Canada was populated and settled by immigrants from overseas and that the process is now going on internally from one region of Canada to another. To develop the North economically we must have expertise from outside, and I would most certainly not wish my remarks to reflect adversely on anyone who came here as an immigrant or as a carpet-bagger. Most of us who have made our homes in the North came originally for specific reasons; in my case I came as a fugitive from the depression and I am not ashamed of this. This has been a good country to me and I am happy to have spent the last thirty years 'North of Sixty', and I hope to spend the rest of my days here. If I have inadvertently conveyed the impression that one has to be a native to participate, let me hasten to correct it.

The question of what we must do to equate the spending value of the sparsely populated areas of the North with their highly developed counterparts in the South, is a major task of government, and certainly, at this Conference, the two Ministers present will agree that import and transportation cost is the name of the game.

It is the amount of traffic which ultimately effects the cost and, as this increases transport costs will be reduced,

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not only for individuals but as part of our entire social background, including getting our goods to market. This, and the mutual participation of immigrants and those who were born here, is the key to development of our economy. If, in the process, private enterprise can make a profit without breaking the back of the rest of us who are also taxpayers, then I think that you would agree with me that both airfields and roads will ultimately lower the cost.

Mr. R.J. Orange:-This gentleman in the centre, here.

DELEGATE: Mr. Emil Dinkla - (Vice-Pres., Acres Consult. Services Limited, Toronto).

My question is addressed to the Chair. Do we take advantage of the experience of places such as Alaska, Greenland, Norway, Finland, Russia, etc., or, alternatively, if we are ahead of them, do we export our particular expertise? I was sad recently to learn that the United States went to Finland for icebreaker designs - 140,000 horsepower.

Mr. R.J. Orange:-Well Mr. Dinkla, I have observed this same phenomena of the interchange of ideas. I was favourably impressed by the interchange in certain areas of government. For example the interchange of Russian and Canadian scientists through the Department of Energy, Mines and Resources and their

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department in Russia. We have just had in the Northwest Territories a group of young people ages 18 to 25, who are undertaking teacher training programs which will permit them to teach in our schools here in the Northwest Territories. They have just returned from Alaska where they have met and discussed their problems with their counterparts at the University of Alaska. I believe though, however, that we have a long way to go in some areas, this interchange is something that is new, this exchange is something that is just starting and I believe that it has to continue in all phases of northern experiences.

DELEGATE: Mr. John Robertson - (Hay River)

I have two comments on the current discussion. My community is totally involved in transportation which forms our economic base; having listened to the discussion here I think that the problem of high cost is one which cannot be solved in a couple of weeks or even a couple of years.

Governments, both federal, territorial and municipal, should take a close look at the problem and I think they will find that the root lies in inefficient use of land, equipment and resources. This is equally true of water and air transport.

Perhaps the use of containers will eventually solve the difficulties due to multiple handling of goods; freight is now handled ten times where it could be handled once, a notable item in the high cost of transportation.

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On subsidies, I think as an outright subsidy, the principle is wrong. Perhaps we should think of area differentials in salary, because by this means taxation could be paid by all in proportion and this would go far to adjust the present inequality between native and transient wage earners.

Mr. R. J. Orange:-Thank you very much John. Well ladies and gentlemen we've come to the end of our panel, if I may just thank the panelists for their contributions on behalf of the organizers of the Conference.

In summing up this discussion, and thanking everyone for their contributions, I think we have gained the impression that the people of the North want to be involved, want to share in the decisions which affect them, want to see resource development proceed, but with these several improvements they are very concerned to see that the quality of life in the North keeps up with the volume of new construction.

I think we all recognize that really there is no magic answer to all of these problems, that what we're looking towards are not instant solutions as Mr. Jamieson said but plans which will recognize the very basic difficulties which we face as Canadians in this northland, in developing it in an orderly and proper manner. So as this Conference continues I think you might bear in mind that Northern people want to be involved, they want to be part of the action, if I may use that

expression, and as such they feel that they're prepared to look to the experts from the other places to come up with the ideas and working together as Canadians maybe we can solve some of the problems. Some of them will take a long long time to do, and some of them I think may be overcome very quickly.

VOLUME 1SECTION 3 - PANEL DISCUSSIONS AND SUMMARIES
OF PAPERS PRESENTED

"We really get the impression that now the people, those who represent different elements in northern development, are willing to sit together to discuss the issues, to look into the problems and to come up with some acceptable policies to all the segments that will form the great North. That will be probably Canada's greatest achievement in the 70s."

Jean Chrétien

SESSION 3A
METEOROLOGICAL SERVICES, AIR NAVIGATION AIDS AND AIRPORT FACILITIES

CHAIRMAN: Mr. R.P. Engle, Pres., Northwest Territorial Airways Ltd.

PANELISTS: Mr. G.E. McDowell, Regional Dir., Air Services, Edmonton
Mr. M. Baribeau, Regional Dir., Air Services, Dorval
Mr. F.W. Benum, Chief, Cdn. Meteorological Service,
Toronto
Mr. G.L. Bartsch, President, Great Northern Airways Ltd.,

CHAIRMAN'S OPENING REMARKS

Mr. R.P. Engle:-At the outset I would like to comment on what we have all seen in the last twenty-four hours - the change in the Yellowknife Airport. Today we have a Grumman Gulf Stream II in the airport; we have a Lockheed Jetstar, a Lear jet; and many of you came up on the Pacific Western Boeing 737. This is indeed a real change for the North, and most of those aircraft probably used the instrument landing system, the ILS that was installed here within the last three or four months by the Department of Transport. So facilities are moving ahead here in the North.

Now, I would like to introduce our first panelist - Gordon McDowell - who is the Western Regional Administrator with the Department of Transport, headquarters in Edmonton. It's really with a great deal of indebtedness that I refer to the long-standing co-operation between the Western Region which was previously the Edmonton Region, and the air operators in the North. My experience in working with this Region goes back fifteen years and I can only say that we air operators owe a

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real debt of gratitude to Gordon and his predecessors and the administrators within the Department. So, without further ado, I give you Gordon McDowell.

AIR NAVIGATION FACILITIES BY: MR. G. E. MCDOWELL

SUMMARY

The paper contains background information on the development of air navigation systems in the Arctic together with a short description of the electronic and visual aids to navigation that are currently in use. Also included is a brief outline of the criteria utilized in determining the requirement and priority for establishing navigational aids as well as a summary of possible future technological developments.

Mr. R.P. Engle:-Thank you very much Gordon McDowell. It's certainly very challenging to me, not only the area navigation concept but the self-sustained non-directional beacon that could fill a really good slot between Yellowknife and Baker Lake on the forthcoming east-west lateral air route that is receiving a great deal of discussion today.

Our next speaker, Mr. Maurice Baribeau, Quebec Regional Director of Air Services with the Department of Transport; a career department individual; a fellow pilot. His region is the Quebec Region that includes some of the most rustic and difficult terrain in our Canadian Arctic, including Baffin Island

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and Ellesmere Island.

His discussion today will be basically focused on airports and airport developments. This brings to mind, looking back a few years, the facilities available in the Eastern Arctic. Places like Pangnirtung, in the fiord of Pangnirtung some six - seven thousand foot elevation, - until recently we only had an ice strip to land on with skis. This would be true on the north end of Baffin Island at Pond Inlet. The last landing I made there in the spring of this last year was with a DC-3 on skis but the runway is being lengthened and very shortly no doubt, these communities will be serviced by year round airstrips. Without further ado I give you Mr. Baribeau.

ARCTIC AIRPORTS BY: MR. M. BARIBEAU

SUMMARY

The paper contains background information on the origin and development of airports in the Arctic along with a short description of the existing airport system. Also included is an assessment of future requirements for each general category of Arctic airfield and a summary of current problem areas with possible solutions.

Mr. R.P. Engle:-Thank you very much Maurice Baribeau. Your vision of some five major hub airports around which community development in the North can develop, is a very challenging one

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and I am sure it will be echoed in other panels at this Conference.

Our next speaker, Mr. Frank Benum, is another individual to whom the airmen in the North owe a great deal of thanks; to both him and his branch the forecast division of the Department of Transport.

I think back some years here again at the Yellowknife Airport when, in the early 1950's we had about a 12' x 20' Butler Building on the airport. It was really the only metal building on the airport, in which was headquartered the Met office and that's where all the air crews would meet in the morning. And I can say that we have a strong affinity for the forecasters that have served in the North that have moved on to Headquarters. Frank is the Chief of the Forecast Division of the Meteorological Service. There has been a great change in forecasting in Arctic weather. Just talking briefly before lunch today, I hadn't realized that the satellite Fax pictures that we get here in the forecast office in Yellowknife originate in Washington, D.C. and that we can look forward to additional satellite weather coverage for Arctic navigation purposes in the years ahead.

I also had a question, and I hope I didn't jar Frank's nerves a bit, but I asked about the computer in Montreal because due to the local conditions in the North many times the local weather may differ substantially from the computer forecast, but I understand that even the computer is subject to adjustment by local conditions today.

So without any further delay, Mr. Frank Benum.

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METEOROLOGICAL SERVICES IN THE ARCTIC

BY: MR. F.W. BENUM

SUMMARY

The paper states the overall objectives of the C.M.S. including that pertaining to ice information in the Arctic. It reviews the major expansion in economic development, their geographical areas and other applicable traffic routes in the Arctic and follows by pointing out the additional requirements of a weather observing network to improve the service to the user. It points out that meteorological services are of relatively greater importance in the Arctic due to the severity of the climate. It reviews the requirements of the service into categories of basic living, transportation, construction, oil pipelines and government development projects. It defines its service as essentially involving itself in three areas, historical data (climatology), current data and prediction (forecasting). In all these areas it outlines the additional requirements of the C.M.S. to meet the anticipated demand while pointing out prevailing deficiencies. More specifically it points out the forecasting problems as a result of these deficiencies in the Viscount Melville Sound, Central Keewatin District and Central East Mackenzie District.

The service appears to be relatively adequate for scheduled air traffic; however, due to the lack of habitation etc., it is significantly deficient in providing a service to nonscheduled flights over the non-established routes. The paper

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proposes that C.M.S. services be extended through the use of improved utilization of prevailing facilities, the training and utilization of native observers, the implementation of east-west weather communications circuits, increased research on the climate and the development of automatic instrumentation.

The paper concludes that a modest expansion of systems, facilities and personnel will be required to meet the demands on the service for the provision of its information in the Arctic region.

Mr. R.P. Engle:-Thank you very much Frank Benum. To introduce the next speaker gives me a great deal of personal pleasure - Gordon Bartsch. A long time working pilot; a current pilot today; many years of experience in the Yukon, in the Mackenzie and in the Arctic Islands; active in the top management of one of our northern air carriers, - Great Northern Airlines ...Gordon.

ARCTIC AVIATION FACILITIES
BY: MR. G. L. BARTSCH

SUMMARY

In his paper, Mr. Bartsch stresses the need of a long range development plan for aviation facilities in the Arctic. He comments as well on the high costs which must be absorbed by aircraft operators and which he feels could be reduced by proper planning. Deficiencies in the present "Airports" and

"Nav aids" systems are listed and he then goes on to describe changes that should be implemented. These include:

- a) Development of a major all-weather airport to serve as an alternate for Resolute.
- b) Establishment of a triangular network of airways encompassing Inuvik on the West, to Hall Beach on the East and Alert on the North.
- c) Provision of VOR/DME facilities at nine locations in support of these airways, together with necessary MET facilities and communications.
- d) Introduction of a requirement for a special licence endorsement before pilots can operate north of the DEW Line.
- e) Improve dissemination of MET and other information throughout the Arctic.
- f) Regular weather broadcasts from DEWLine sites.

Mr. R.P. Engle:-Thank you Gordon Bartsch.

Weldie Phipps from Resolute Bay could not make it here today and I've been asked if I would read his paper.

For those of you who don't know Weldie, he is an upper Arctic pilot of considerable experience. When I first met him he was flying a Super Cub on large oversized tires in the 1950's, developing the concept of landing on raised beaches other than airstrips, in other words taking a light aircraft and choosing

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the landing site from the air, in effect doing a helicopter job with a more economical fixed wing aircraft. He subsequently founded Atlas Aviation which is based at Resolute Bay. It operates unit toll services to Arctic communities, Pond Inlet and the Joint Weather Stations in the Arctic Islands. He also does a very basic job in Twin Otter charter transportation for the oil and gas companies to the Arctic Islands connecting with scheduled services at Resolute.

AIR TRANSPORTATION IN THE HIGH ARCTIC

BY: MR. W.W. PHIPPS

(Presented by Mr. R. P. Engle)

SUMMARY

In his paper, Mr. Phipps outlines some of the difficulties facing aircraft operators in the High Arctic. The operational problems referred to include:

- a) Magnetic compass unreliability.
- b) The vast distances between navigational facilities.
- c) Scant weather information.
- d) Communication blackouts.
- e) Obsolete radio aids to navigation.
- f) Lack of personnel with Arctic experience.

Mr. Phipps then goes on to list suggested changes with regard to Airstrips and Airports, Radio Aids to Navigation, Approach Aids, Personnel and Government Assistance that he feels would improve the existing system.

Mr. R.P. Engle:-I think Weldie has brought up a very pertinent point. To this day there is a high input of the individual in Arctic operations.

Well that completes our panel papers. I see our time is running relatively short. May I now ask for questions and discussions from the audience.

SESSION DISCUSSION

DELEGATE - Mr. D. N. Watson

I was sincerely encouraged by Gordon McDowell's approach to the future and I hope that Gordon is able to carry this off because I know that he is a seriously dedicated member of the organization that we are so dependent upon in air transportation. He also has the constraints of the Treasury Board and I fear frankly that they may beat him out ultimately. He has done a tremendous job in waging battle with Treasury Board over a good number of years and has made many substantial improvements to the navigation aids and the facilities in airports and terminals and so on in the region in which he is responsible. Unfortunately, we'll never give him enough credit because we still want more. We believe that there is a serious requirement for more. Gordon was talking about the possibility of navigation aids that could be serviced by a simple helicopter pass. Simply pop in with a helicopter and service this facility and its man and men or whatever it might be. I would sincerely hope that he doesn't

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encourage the Government to buy some helicopters to do that, that they use the commercial helicopters that are existant in the area in order that we can get this price down to \$1.05 a day that he talked about because frankly right now my company is running a beacon for the Department of Transport which everybody is using at Contwoyto Lake and it is making more money for us than the airlines. I expect to hear from the Minister by next week and have our profits cut substantially in that respect, but everybody is using it. As a matter of fact our company has in its system six non-directional beacons operating and these are basically functional responsibilities of the Department of Transport. With respect to the one at Contwoyto we do have a contractual arrangement so in effect you might call it a Government beacon. For our own convenience and in order to allow us to conduct our operations in many areas in the North and in British Columbia we have about six non-directional beacons that we own and operate under the jurisdiction of the Department. This is not properly an air carrier's function in the strictest sense of the word but we must operate and we must operate with some degree of precision so therefore we provide these facilities.

The observation was made by Gordon that any facilities that he envisaged for the future must be, of course, economically sound and this is a phrase that catches me right over the cigars as you might say because I think we continuously refer to the

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cost-benefit factor when we're dealing in the North. In this respect Mr. Minister and Ladies and Gentlemen, the cost-benefit factor as we know it in Canada, in terms of building highways or bridges and so on, must not and cannot apply to Northern development because if you were to apply the cost-benefit factor to Northern development we would have nothing in the North. Indeed, we would have nothing at all. Air transportation to somebody in Inuvik is at least a million times more important than air transportation to someone in Toronto when he wants to get to Montreal because he has at least four alternate sources of transportation, but at Inuvik he has no alternate sources of transportation nor does he at Resolute Bay. So while you may wish to apply cost-benefit factors for an exercise in Government, in Government administration of funds which we recognize are after all the funds that the public of Canada subscribe to the provision of the administration of a country, these must be properly administered. So you must look or gauge them properly. So you have to use some formula; but it is my respectful submission to you that you must not use the cost-benefit factor when you're rating matters in the remote areas of the North. And that is why I believe that the cost-benefit ratio has been used far too often in the determination as to whether or not an airport should be built, or paved, or radio aids or navigation aids should be used or installed. The company I represent has invested some \$40 million in airplanes that are equipped to fly

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into JFK Airport or Toronto Malton or Dorval with all the navigation aids, the best in the world. But what are we using? In most cases, we are using facilities that were designed in 1942 for war purposes. We are doing ADF letdowns on 16 different facilities in British Columbia and the Northwest Territories and those facilities were designed in 1942 or 1940 and here we've got all the electronic hardware to go down - right now to the very minimum weather criteria for J. F. Kennedy Airport or Toronto Malton and can't use it. So we incorporate hardware in our airplanes that the American air carriers don't have to incorporate because they would never go to such a system as an ADF letdown system but we must incorporate this. And yet these people at Inuvik, Resolute Bay and Yellowknife are first class Canadian citizens. They're not second class Canadian citizens but because of what I suspect, and I stand to be corrected and criticized by the Minister or his staff - but I suspect that the cost-benefit factor has been used in gauging the importance of these facilities at these airports when they made a determination at Treasury Board as to which would be appropriate for them.

I have one particular problem that rankles me, and again everybody here knows that I'm always in trouble because of saying things that I understand and believe in. There is an appropriation of funds being made and has been made perhaps for the extension of the Victoria Airport to 7,000' - it's presently 6,000'. Now we have Ministry approval presently - Ministry of Transport

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approval to haul 117 passengers with a Boeing 737 out of 5,000' at Victoria when they displaced 1,000' for construction purposes but it's going to go to 7,000' - they need 1,000' for construction purposes so they are going to displace that 1,000' and we can still haul the full load of the airplane out of the airport at 5,000'. Now I have to ask why are they going to extend their runway? Because 7,000' will not accommodate a DC-8, so let's assume that the national air carrier doesn't have that much influence on the Treasury Board and that it's not to use a DC-9 or some such thing as that. Let's assume that it's a military requirement because Victoria is important for military purposes. Well, my suggestion is that the Department of National Defence should come up with the cost of extending that particular airport and leave those funds available to Transport for the expenditure on improvement of airports in the N.W.T. Cambridge Bay as an example for somewhere between \$50,000 and \$100,000 could be improved substantially. It happens to have a type of shale or ballast or whatever you wish to call it - that is used for a gravel surface that is so sharp and abrasive in nature that while providing a scheduled service we have cut and demolished 32 main wheel tires in 3 months. I think these are the important things and Gordon McDowell accused me the other day of having a turkey shoot at Calgary when I talked about these things and I talked about them in good faith.

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A very knowledgeable petroleum man came before us and talked about 239 million cubic miles, or trillion cubic miles of sedimentary formation. It didn't mean anything to me but it sounded like a big thing and it was all in the Arctic and we're supposed to be a part of this. How do we stay in step with 239 trillion cubic miles of sedimentary whatever it is if we can't gear ourselves in transportation to stay in step with that. We must ask for the indulgence of not only Transport, not only the Minister and his staff, but we must ask them to encourage Treasury Board to take a more serious look at the actual potential of the Arctic in order that they can assist us in providing a service to that particular area. When my good friend Maurice Baribeau was speaking he mentioned that the North must be prepared to compete with the South for money and this prompted me again to think of the cost-benefit factor and I tend to agree with it and yet Maurice will, I am sure, forgive me for not agreeing with that. This happens to be a fact he knows of but I can't agree with the philosophy because I think that the North should have priority on money. Also Maurice indicated that the matter of Northern sovereignty was bringing about a new emphasis on defence. I hope that I misunderstood him when I interpreted what he said to be an indication that we were going to have to create a new level of defence in the Arctic in order to protect our sovereignty, because the only people that have challenged us so far on sovereignty of the Arctic Islands, insofar as I know, and I do spend some time

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there, are our very good neighbours from the South and I think that that matter has been disposed of in another way. I hate to think of all those surplus CF-5s or whatever it is that have been built and are laying around, just cluttering up the airways when we don't have any real air control. We talked about private airways and may I say that every route my company flies in the North is a private airway that we have registered and documented in our manuals which have been approved by the Ministry and I would hate to think of those CF-5s getting a free ride on our airways.

Mr. R. P. Engle:-Our time has expired. Don you did an excellent job of summarizing for the panel. I would like to thank my fellow panelists here and thank you all for your kind attention.

SESSION 3B
EASTERN MARINE RESUPPLY (INCLUDING HEAVY HELICOPTER
OPERATIONS)

CHAIRMAN: Dr. G. Jacobsen, Pres., Tower Co. (1961) Ltd.

PANELISTS: Mr. A.H.G. Storrs, Dir., Marine Ops., MOT, Ottawa
Mr. R. Currie, Vice-Pres., Panarctic Oils Ltd.
Mr. B.N. Malott, Pres., Transworld Shipping Ltd.
Mr. C.N. Crawford, Gen. Manager, Klondike Helicopters
Mr. E. Martin, Traffic Manager, Chimo Shipping Ltd.

CHAIRMAN'S OPENING REMARKS

Dr. G. Jacobsen:-After the philosophical contemplation of transportation in the role of the Arctic community, we come down to the hardware and the hard facts of life. We're coming to the discussion of the eastern marine supply. The eastern field was for many years, and still is the main supply of the greater part of the Arctic, of the archipelago, the Queen Elizabeth Islands, Baffin Island, and all the Arctic right to Ellesmere Island and to north parts of Banks Island. It is the life blood of the most Arctic communities and brings the heavy equipment and the durable goods.

It is my pleasure to introduce our first speaker, the Director of Marine Transportation of the Department of Transport, Admiral Storrs.

EAST ARCTIC MARINE RESUPPLY BY: MR. A.H.G. STORRS

SUMMARY:

After reviewing the historical development of Eastern Arctic Resupply to explain the special part now played in it by the Ministry, the paper considers future requirements for resupply.

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For Government purposes neither military nor non-military requirements should lead to major change in resupply tonnages. Requirements for non-government resupply are impossible to estimate. Failure to find oil in significant quantities could lead to a loss of interest and dwindling activity. A major strike could lead to large scale drilling of production wells. In the latter event, resupply tonnages could reach one million tons a year for the whole of the Arctic.

Air and sea modes are compared for resupply purposes. Air, though still more expensive, has the advantage of year round operation, of making large stock piles unnecessary, and of being able to supply urgently needed materials quickly. The sea mode is still cheaper and better able to cope with bulk supplies. For the foreseeable future a mix of both modes is likely.

The nature of the Arctic is considered briefly and the point made that for summer operations in the East Arctic, the problems are not significantly different from the Gulf. The extension of the season into winter would introduce problems of completely different dimensions.

Government policy relating to transportation is briefly reviewed and Arctic requirements then considered in this light.

Way services, such as aids to navigation, charts, meteorological services, ice support, etc. are clearly government responsibility. Services are at present sketchy because of the

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lack of traffic, and a major increase in traffic could be handicapped by a shortage of icebreakers. There are no icebreakers capable of effective support of winter traffic.

Terminal facilities are covered in another section, but the question of Resolute and Radstock Bay is reviewed briefly.

Vehicle services pose the question of what part the government should play in providing vehicles for this route. It is concluded that the evolution of the East Arctic resupply has shown that industry is capable of providing and operating the ships, and under present circumstances there is no requirement for a government shipping service. A major expansion of traffic could lead to a shortage of suitable vessels for Arctic operation and could cause some modification of this principle.

Regulations for operation in ice which hitherto has been left to the discretion of the ship owner has become necessary as a protection against pollution.

The problems of the modification of present punitive insurance rates is considered and comment made that up to now it has been policy that except in war the underwriting of vessels is a matter for industry and not government.

Dr. G. Jacobsen:-Thank you Mr. Storrs for your very excellent talk. Our next speaker is Mr. R. Currie, Director of Land and Administration for Panarctic Oil.

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RESUPPLY - A REVIEW, BY: MR. R. CURRIE

SUMMARY:

Mr. Currie opens his paper with a technical review of the problems of oil exploration in relation to permits, leases and farm-out agreements. The purpose of this is to highlight the importance of logistic study and planning in the success of the venture and to stress the very critical role that transportation plays. For instance, the only really satisfactory time to move a rig from one site to another in the High Arctic is in the spring or fall, and this is but one of the major factors that make a planned drilling programme so complex.

Air transportation is the first preference with Panarctic because of its flexibility, efficiency and reliability. Nevertheless, it is expensive and, except in situations of emergency or in extreme programming difficulties, the sea lift is mandatory for fuel and heavy and bulky equipment.

An interesting point is that Panarctic considered four sea routes for their High Arctic resupply. From Vancouver along the coast to Alaska; the Mackenzie River route and then through Prince of Wales Strait; from Churchill through Foxe Basin and Fury and Hecla Strait. These three turned out to be so much more expensive with such unpredictable ice conditions that it was concluded that the only practical route was the Eastern route. He stresses the costly disadvantage of multiple handling of cargo by sea transport - in some cases up to eleven

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times.

In spite of the fiasco of the LEARMONTH and the JOHNNY NORBERG in 1968, he still feels that barges may have some use and is still most hopeful for the future of the Alexbow in the Arctic.

He complains about insurance rates and comments that their own programme of attempting to educate underwriters has not had very much success, though conceding that the barge episode did not help.

He makes the point that an appreciable expansion of activity would reveal a shortage of Canadian ice strengthened vessels and that in such a case, the oil industry might be forced to obtain their supplies and vessels abroad.

He praises the Hydrographic Service for their ability to rise to the occasion and help out with sketch surveys of new and unexplored landing sites.

He also has reached the same conclusion as Percy Crosbie, that for his purpose of moving drilling rigs and shipping in supplies to the High Arctic, a relatively small ship of about five thousand tons seems to be the best.

Dr. G. Jacobsen:-Thank you Mr. Currie. Our next speaker is Mr. B.N. Malott, President of Transworld Shipping.

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EASTERN ARCTIC TRANSPORTATION SYSTEM IN THE 1970's
BY: MR. B.N. MALOTT

SUMMARY

This paper deals generally with both inward resupply and outward bulk movement as some of the topics discussed are common to both.

He stresses the very significant and decisive part which the high cost of premium of extra insurance could play in Arctic development. He believes it essential that rates should be brought down and that the most helpful way of doing this is by educating underwriters in the true risks of Arctic shipping. He believes that the government has a part to play in this process.

He discusses the types of vessels likely to be needed and considers that dry cargo ships will be in the order of fifteen thousand tons dead weight and tankers between sixteen and eighteen thousand tons. Because of the short season they will have to be able to operate in general trading during the winter and this will be difficult to do profitably because of the high cost of construction to meet Arctic requirements. In order to help make this kind of ship viable he believes that long term charters are needed.

He does not dispute the desirability of restricting trade between the Arctic and Canadian ports to Canadian flag ships, but does not miss the opportunity to refer to his company's misfortune in respect to their experience with the Cabatarn and Global Envoy.

He points out that a Canadian owner must pay a substantial premium to operate under the Canadian flag as compared to the Commonwealth flag, and believes that this should be made up by government subsidy.

He rejects the view that export of Arctic resources should be done only by Canadian flag carriers. The extra costs could involve major subsidies and considers this to be unreasonable. He cites as an example the trade in bulk grain from Churchill which would come to a stop if restricted to Canadian ships without subsidy.

He believes that there should be three major ports in the Eastern Arctic north of Hudson Strait to act as distribution points. In any event a start should be made on the development of harbour works at Frobisher.

Dr. G. Jacobsen:-Thank you Mr. Malott, for your very concise talk. It seems that the underwriters really do need education; we find this too. The main thing is that they don't seem to be aware of the real conditions. Our next speaker is Mr. Nick Crawford, General Manager of the Klondike Helicopter Division of Kenting Ltd. who will present the paper prepared by Mr. J. W. Strath, who was not able to be with us today.

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THE USE OF HEAVY-LIFT HELICOPTERS IN EASTERN MARINE RESUPPLY

BY: Mr. J. W. Strath

(Presented by Mr. N. Crawford)

SUMMARY

A brief review is made of the factors leading up to the development of the use of heavy-lift helicopters for the delivery of cargo from ship to shore in the Arctic.

The principal ones are:

- lack of ports and piers
- high operating cost of landing craft and associated equipment
- the critical time factor

Under the auspices of MOT a field trial was successfully conducted between July 10 and August 6, 1969. The Sikorsky Skycrane S64 helicopter airlifted more than 1,000 tons of cargo from the motor vessel "Sir John Crosbie" to precise locations in the settlements of Cape Dorset and Coral Harbour. The success of this operation led to a second more extensive 32 day trial in 1970 during which a grand total 2,862 tons was off-loaded by the Skycrane: e.g. Resolute 900 tons in five days to eight different locations inland. Where possible cargo was flown direct to warehouse doors or construction sites to minimize handling. Cargo damage was estimated to be less than 1% for the entire operation.

The author stresses the advantages of this system: flexibility, reliability (operations were carried out in ice and weather conditions which would have halted all other methods), reduction of handling and time saving. All these are pertinent to exploration and development in the Arctic.

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Dr. G. Jacobsen:-Thank you Mr. Crawford. Our last speaker before we have a general discussion will be Mr. E. Martin, Traffic Manager of Chimo Shipping from Montreal.

RESUPPLY IN THE 70's BY: MR. PETER CROSBIE
(Presented by Mr. E. Martin)

SUMMARY

This short paper opens by briefly tracing the development of mineral discoveries to date but, more than other papers in this series, stresses the factor of "Sovereignty" as an element leading to an increase in resupply requirements.

He defines the Arctic in two sections - north of Cape Dyer as the "High Arctic" and south of Cape Dyer as the "Middle North". He points out that Cape Dyer is also significant in relation to premiums for insurance.

He stresses the essentiality of well strengthened vessels for use in the High Arctic but advocates the use of much smaller craft, those of two to five thousand tons deadweight, which incidentally is about the size of his own ships. His reason for this is that there is some advantage in splitting up deliveries to make two calls per season rather than one with a larger type vessel. He believes that this kind of ship should also carry its own barges and towboat for cargo handling purposes.

He sees little change in pattern of resupply in the Hudson Bay area during the next decade.

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SESSION DISCUSSION

CHAIRMAN: Dr. G. Jacobsen

I would like to thank Mr. Martin for his short but very useful elaboration. We are starting the discussion now, anybody who has questions or ideas is quite welcome to bring them forth, and we'll hand the microphone around to those wishing to talk.

DELEGATE: Mr. J. Naysmith, Chief, Water, Forests & Land Division,
Ottawa

Both Admiral Storrs and Mr. Malott, at least as it came through to me, made the point fairly clearly that one of the major objectives should be to educate the underwriters, because we evidently have the capability for producing or constructing a ship which can function in the Arctic with the possibility of a major oil spill being minimal. I should like to ask either one of these gentlemen if they would like to comment on another dimension to this question. With respect to insurance and the unknown of the cost of clean-up, if there was a spill in the Arctic, and secondly the problem of quantifying the cost or the values lost to people living in the Arctic as result of a major spill. Surely this is one of the major considerations with the insurance people, and I should suggest that in addition to the educative process that you discuss that we in turn have to come up with some of these values, we have to actually quantify this aspect of

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it before we can come up with a realistic cost of insurance.

Will either one of these gentlemen comment on this please?

Dr. G. Jacobsen:-Mr. Malott would you care to comment on that?

PANELIST: Mr. B.N. Malott

Well, I think we've all been affected by the Arrow incident off Nova Scotia and it seems to have colored all our thoughts. This question of insurance of course has been existent for some time, years ago most of the oil being transported to the Arctic went up in drums, there was very little bulk oil moving into the Arctic, and these rates existed at that time and still exist. I don't think that the rates are really this question of bulk movement of oil, I really think it dates back for some time past and until the underwriters know the conditions in the Arctic and until there's a large enough market there for them, they're going to still be high. About the clean-up of oil, I guess that would be a very very costly problem in the Arctic but, again most of the people operating in the high Arctic are very prudent operators and I don't think that one really has to worry about a serious oil spill in the high Arctic at least in the Eastern Arctic. I don't know whether I've answered your question but I think it's a problem that existed for a long time even before the bulk movement of oil up there.

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DELEGATE: Mr. A.C.R. Alberty, Consulting Engineer, Gibb, Alberty, Pullerits & Dickson, Don Mills.

I'd like to add a little on the question of insurance, having had discussions with the underwriters in London regarding the Port of Churchill and on extending the season on the Hudson Bay route, and secondly in connection with getting out lead zinc concentrates from northern Baffin Land. My impression is that I don't think we can educate the underwriters in the sense that's been suggested within a reasonable period of time. I don't think that ice information, or weather information, or information on ice breaker service is going to effect them all that much because I'm not sure they'll be able to interpret it. The only information that they are going to use to reduce their rates is the actual record of shipping in those regions-actual statistics and I doubt that there will be sufficient of these in the immediate years to come, to make them reduce their rates significantly. This, in my opinion, reinforces the suggestion that the Canadian government should itself go into the insurance business. Now this may not be a very big fact in the cost of Eastern Arctic resupply but it certainly is in the development and the shipping out of bulk minerals from the Arctic where the present insurance cost north of Cape Dyer can be a very large proportion up to fifty percent of the total cost of shipping out that commodity.

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DELEGATE: Mr. Michel Brochu, Arctic Research Centre, University
of Montreal, Montreal, P.Q.

I should like to add some support to Mr. Malott's comments. I believe that his comments on the subject of insurance are absolutely correct. The navigation season without risk of danger in Hudson Bay and in Hudson Strait is on the average 153 days a year. This excellent period for navigation in Hudson Strait and Hudson Bay is confirmed by statistics. Unfortunately, not all statistics are from Government sources but some from the Oblate Missionaries who have been located in the Hudson Strait for many years. They have kept precise records of the break up of ice in the fiords and in the river estuaries. This information is such that I can affirm that the minimum period of navigation is 153 days a year, that is to say 5 months a year. Hence, the insurance companies are not justified to have such fears about the Arctic waters. This should be of some encouragement to Mr. Malott and the others with similar problems of high insurance rates.

The same problems were encountered with insurance rates regarding winter navigation in the St. Lawrence. Dr. Camu and I did some work on this question in 1958, 1959 and 1960 and he can confirm that we had the same difficulties and I believe that the insurance companies have revised their rates since then.

The previous speaker has stated that nothing much could be done but I believe that surely there is some action that could

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be taken and I will give you an example of what I mean. Here is an ice chart published by MOT for November 9 - that is not summer time that is the 9th of November in the autumn almost winter time in the Arctic and what do you see on this chart? The water is free of ice. There is a total absence of ice. This is a photograph taken by satellite which could be supplied to the insurance companies and provide irrefutable proof of the excellent shipping conditions which prevail in the autumn. It is the best navigation season if I may say so because there is absolutely no ice, whereas in August and the beginning of September in the centre of the Bay there can be small icebergs but in November the water is completely free. Unfortunately, the November 9 ice chart is the last one of the year and I believe that this is something for which MOT may be gently criticized for stopping the publication so early in the season when they become most interesting. I, therefore, would like to suggest to the Minister of Transport that these charts be published throughout the year in the same way as the weather charts.

I would also like to suggest that consideration be given to the use of a Russian method to extend the navigation season. The method is simply to spread a mineral in granular form on the surface of the Arctic ice to expedite the melting. This suggestion is one that we should think about and of course it would require international participation.

My last suggestion is one that is prompted by experience

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in the St. Lawrence to employ ground ice observers on the Arctic Coasts. Satellite and aerial observation do not provide complete coverage above the 66th parallel because of the long periods of continual night. I think full ice information is extremely important and can best be supplied by ground observers. These have provided magnificent results throughout the Gulf and the St. Lawrence River but here again the observers have now been withdrawn and I believe that this is a serious mistake. These are false economies.

DELEGATE: Cmdre Robertson, Northern Associates Ltd.

Mr. Chairman, I just get a little bloody minded, but this lack of definition, people continually bring up this question of oil pollution and equate with the Arrow. Now you're talking about two different subjects. That beautiful example of an oil tanker, that piece of tired old iron, the Arrow, what would happen if she got into the Arctic, what or how are we going to cope with it. I can assure you gentlemen with the skill that she displayed in navigation she would never find the Arctic. The other thing is oil. Now, if there is a spill undoubtedly there will be a danger to the ecology but here again please define oil. If it is a spill of the diesel oils, the light diesel oils, which are normally taken into the Arctic, we don't import into the Arctic the bunker c's, we take in the diesel the light white diesel we are going to use. Now these dissipate very very easily, they would not be

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the threat to the ecology that the heavier oils the export oils would be. The other thing is everybody keeps on saying ice, ice is ice is ice, ice like Stein's poem, A rose, is a rose, is a rose, ... there are different kinds of ice, there are different kinds of menaces, and it is today quite feasible to design ships depending on the area in which they are going to go where the risk of loss of cargo would be so slight that you could almost neglect it. Thanks.

DELEGATE: Mr. M.G. Ross, Pres., Cogemar (Quebec) Limitée.

I have two questions one for Mr. Malott and one for Mr. Martin. Referring to this morning's meeting, most of the northern people seem to worry about the economics and the cost of their goods. We have developed a cargo ice-breaker with the idea that it could be used to supply the North to say Resolute. If you want to be conservative to a minimum of about eight months. This for Mr. Malott: We contacted two very big underwriters and are concerned too about the insurance rates. The cost of the cargo-icebreaker will be quite high as far as insurance is concerned, but the fact that we are building a ship for northern use and to meet northern needs, the insurance will be the same as if we had built a ship for the normal use. So going back to Mr. Martin you said that you wouldn't go bigger than what you have now as far as ship size is concerned. If you had a little bigger ship with all the facilities you mentioned, would you then agree with

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this cargo-icebreaker idea?

PANELIST: Mr. B. N. Malott

Well, I think first of all that the vessel built as a cargo icebreaker, would be a very costly vessel to build. Secondly, I don't know what size you're contemplating but it would seem to me you would have to have very high freight rates in order to maintain the vessel for a period of time. Again I don't know what you contemplate as period of time but I think it would be a most costly venture but this is up to you to decide and I think the freight rates would have to be very high.

PANELIST: Mr. E. Martin

As far as I'm concerned the question of an ice strengthened ship in the Arctic is not new, our little ships and I say little because it's a relative term, the Chesley A. Crosbie, and the Sir John Crosbie, are the two strongest ships, non-icebreakers that have been built in Eastern Canada to date. These vessels are two thousand tons deadweight vessels, and as such have one hundred and ten thousand cubic feet. For the particular jobs we are doing at the moment in eastern resupply for example, the vessel fit the bill. We can also see that the vessels are maybe a little small, you should perhaps get into 3,500 tons or even 5,000 tons heavily ice strengthened ships, for that resupply run if the general cargoes are going to increase in size. There is only one basic

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problem in doing this, the two ice-strengthened ships that we own, are extremely difficult to operate on an economical basis through the rest of the season when we can't run into the Arctic. We have trouble competing with foreign flag ships and other Canadian flag vessels in the Gulf of St. Lawrence running to Newfoundland down the East coast to the U.S.A., Canada to the Caribbean, Canada to West Coast Africa, etc. It would seem to me, and we've gone over this time and time again in our own office, our ideal may be at the moment a five to six thousand tonner heavily ice-strengthened plane bow to thrust the ice as she plows through overpowered, as are the two other small ones that we have, so that when you get into the ice you take the governor off and use the power that's built in. But if we can't use the two small ones that we have now, in the other parts of the year, we can but it's very difficult, we cannot foresee how we could use a larger ship economically and this would mean we would then have to put a daily charter basis or a daily cost factor against this ship for Arctic use that would make it prohibitive even for the Arctic.

Now there is one other question in this regard and that's the question of insurance when a ship is ice-strengthened to Lloyd's class one or there about there is a reduction of insurance up to 50% in some parts of the Eastern Arctic. It doesn't apply to all areas, so this is a benefit to the owner who has a Canadian flag vessel that's strengthened but it doesn't apply everywhere and

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consequently the total picture is one of economics only. I think any builder Mr. Malott, ourselves or your small company as you mentioned would just love to build a ship of this nature but the economics at this moment are difficult and I don't think that a subsidy as such, a direct subsidy from the government is the answer although I wish I did have the answer.

DELEGATE: Mr. J. L. Doherty, Marsh & McLennon Ltd., Montreal

I am an insurance broker, and I'm feeling very lonely here tonight. The reason I think, or some of the reasons the rates are so high is because London, the London market which set these rates a number of years ago, got away with it and they were getting away with it in a time when we didn't know as much about the Arctic as we do now. Things have changed and the market has not changed with it, but I think the market is beginning to change. We have for example this past summer season broken the Hudson Bay, Hudson Strait rate. We did get a discount on an ice-strengthened ship, this does take work and I think the work has to be done by those who are paying the shot. I think from our office alone this past summer we paid underwriters enough money to pay all of the losses and hull damages that I'm aware of with the possible exception of the vessel out of Churchill. I think that you will also find that underwriters themselves will not spend money to investigate this so long as they are winning and they're winning. If they investigate and find it different,

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perhaps the rate will have to come down but I think we must do this. I have been searching information for some weeks now and I have put together a series of questions that I have been asking masters, owners, of the Transport Department, and would be glad to leave these for you, as well as hear answers and the like, to the problems we will confront in the insurance market. It is really experience that counts. What has been the experience, if we can prove that then we can win. London, which is still the seat for setting the Arctic operating premium, will not divulge their figures, nobody has been able to find these yet. I think they're very good so the fight is worth doing.

Dr. G. Jacobson:-Thank you very much. Ladies and gentlemen I'm afraid our time is over. Thank you very much for your participation.

SESSION 4A
NORTHERN ROADS, TRUCKING AND OFF-ROAD TRANSPORTATION

CHAIRMAN: Mr. John Parker, Deputy Commissioner, N.W.T.

PANELISTS: Dr. H.W. Woodward, Chief, Oil & Mineral Div., Ottawa
Mr. T.A. Harwood, Earth Science Div., D.R.B., Ottawa
Mr. J.B. Denison, Air-Truck Co-Ordinator, P.W.A., Edmonton
Mr. N. Carpentier, Vice-Pres., Bombardier Ltd., Valcourt
Mr. R. Kapchinsky, Pres., Kaps Transport Ltd., Edmonton
Mr. W. Koropatnick, Regional Dir., Federal D.P.W., B.C.
Yukon Region

CHAIRMAN'S OPENING REMARKS

Mr. J. Parker:-We will have to step right into our work at hand since we are running a little behind. I will ask the panelists if they will stick to a 10 minute deadline and that will give us a few minutes at the end for discussion, questions and summing up.

Our first speaker is Dr. Harry Woodward who is the Chief, Oil and Minerals Division, Northern Economic Development Branch, Department of Indian Affairs and Northern Development.

NORTHERN ROADS PROGRAMME, BY: DR. H.W. WOODWARD

SUMMARY

This paper covers primarily the official roads programme in the Territories and the criteria under which road construction is implemented and subsidized.

A roads policy was begun by the Federal Government in 1956 to further induce economic development. The current roads programme, adopted in 1965 under the auspices of DIAND allows for a \$10 million annual construction programme over a

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10-year period. This programme is administered by DIAND with territorial representation and participation.

The text defines essentially two basic road categories:

Type I Primary network roads for multi-use;

Type II Resource roads for a more local application to one or more specific developments of natural resources.

To date (commencing 1965) \$5 million has been granted for assistance in road construction by private companies and individuals (Resource Roads). This represents a two-thirds contribution of the cost shared by the Federal Government.

The paper goes on to explain the criterion of priorities in the roads programme, based on density of traffic through to factors such as local employment and economic conditions which would result by their construction.

A road appraisal committee has been formed, and following a three-week tour submitted recommendations of a non-fiscal nature where action is intended. These recommendations suggest that construction of low grade routes be commenced which would progressively be improved to ultimately form trunks. The committee will also be discussing road interfacing with neighbouring provinces and Alaska and asking them to consider a cost-sharing arrangement in these areas. This committee is reviewing bridges across the major rivers and will continue to make a twice yearly fact finding tour.

The paper includes a map illustrating major existing

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roads and those under construction, all of which are primarily in the southern Yukon and Yellowknife regions. The map indicates a future road down the Mackenzie to the delta with cross ties into the Yukon network.

Mr. J. Parker:-Thank you very much Dr. Woodward. Our next panelist is Mr. T.A. Harwood, Earth Science Division, Defence Research Board, Ottawa.

OFF-ROAD VEHICLES, BY: MR. T.A. HARWOOD

SUMMARY

The northern environment varies so widely in terms of climate, topography, surface cover and condition, that the task of vehicle design for off-road transportation of freight and/or passengers is extremely difficult. The critical factors are the surface characteristics and there probably can be no such thing as a practical all-purpose, all-terrain, all-season vehicle. Even if such a vehicle could be designed and built, it would probably not have a satisfactory combination of load capacity, range, mobility, and operating cost, at least for commercial use.

Apart from air supported vehicles which have special problems, the type of vehicle which appears most promising is the fully tracked, fully articulated vehicle with all tracks driven at the same speed. For summer operations wide, large diameter low pressure tires perform much better than tracks.

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In either the tracked or the wheeled version, the front section should be free to move in respect to the rear section, with three degrees of freedom, (roll, pitch, and steer). This final requirement if fully met, presents technical difficulties and leads to less than favourable economics for commercial operation. However, workable designs meeting most of these requirements are now in common use. Trailers, using either wheels (for summer) or skis (for winter) are satisfactory as long as similar attention is paid to articulation and springing so that the vehicle is able to conform closely to terrain irregularities.

The most important area still requiring study concerns driver fatigue and control. These are major factors influencing successful and optimum vehicle operation. Efforts should be continued to develop vehicles that will: (a) reduce driver fatigue, (b) respond automatically to a greater extent to changes in terrain (e.g. by selecting a lower gear ratio or by diverting power to one or another track) and (c) still be operationally reliable.

Mr. J. Parker:-Our next speaker is Mr. John B. Denison, truck-air co-ordinator for Pacific Western Airlines. John Denison is known throughout the Mackenzie area at least and northern Alberta as our own expert on off-road transportation particularly winter transportation. He has put in his own time, more than enough you might say, in this occupation. He has pioneered in this

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area and has proven that he can take trucks in winter into places where no-one else before his time considered it to be feasible. John Dension.

OFF-ROAD TRUCKING-WINTER OPERATION, BY: MR. J.B. DENISON

SUMMARY

Northern surface conditions most often preclude off-road trucking unless the ground is frozen. Up to the 1960's transport demand was best met by a tractor train of caterpillar tractors and towed sleighs, travelling at slow speeds, and frequently creating the road each time it was travelled. Now, when traffic volume is low, the demand is more often met by aircraft.

For higher levels of demand ground transport is still more economic. The usual method is to construct, or reconstruct each fall, a winter road of packed, leveled and graded snow and ice following pre-surveyed routes which may include streams and lakes. Construction techniques used vary with the many possible conditions of weather and physical factors. The roads are capable of providing rapid transit for the largest tractor-trailer units which, travelling day and night move large tonnages. Each unit is self-contained, frequently in radio contact and very often equipped with plows to combat (at very low marginal cost) snow drifting.

Road construction costs vary with terrain but in the

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sparsely treed Precambrian Shield it averages \$100 per mile. Federal assistance in the construction of these roads has been significant in the development of new resource fields.

Mr. J. Parker:-Thanks John. I would like now to call on Mr. N. Carpentier General Director of Industry and Development of Bombardier Limited.

OFF-ROAD VEHICLES-ENVIRONMENTAL CONSIDERATIONS
BY: MR. N. CARPENTIER

SUMMARY

The prospective profits arising from development of the North are considered against the potential risks to the environment. The clear need to take the necessary precautions to minimize the risks is recognized. The difficulty is in deciding what the reasonable and acceptable calculated risks should be. For private industry generally and for the manufacturers of tracked vehicles in particular, there is an urgent need for a clear statement of Government policy and guidelines on equipment for northern development. The company which the author represents have the technical and financial ability required to develop vehicles for the North but are reluctant to invest a lot of capital in such development until restrictions and regulations are published. If there is further delay in issuing these regulations it is likely that the required vehicles will not be available when

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needed and "the entire rhythm of Northern development will suffer as it has done in Alaska".

Mr. J. Parker:-Thank you very much Mr. Carpentier. That's a very thoughtful and interesting and to my mind, valid approach. I can see obviously that a position has to be taken before a developer of a new vehicle can see fit to invest the kind of money that is necessary.

The next paper was to have been presented by Ken Baker who is the head of the Department of Public Works and Highways for the Yukon Territory however Ken was unable to be here. We are fortunate indeed to have with us Bill Koropatnick, (the regional director for the Federal Department of Public Works for the BC Yukon region) who has kindly consented to read Ken's paper.

YUKON ROADS, BY: MR. K. J. BAKER
(Presented By Mr. W. Koropatnick)

SUMMARY

The Alaska Highway, the best known Yukon road, was built for military reasons. Most of the other roads were constructed to serve the mining industry.

Short, heavily used sections of the Alaska Highway are being paved to reduce maintenance costs. As these are near major centres, there are also dust reduction benefits. Other dust control measures are being used elsewhere, with beneficial results for driving safety, time, and comfort, and to road

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conditions and maintenance.

Road improvements have also been made by replacing ferries with bridges and reconstructing existing bridges. The main ferry still operating is on the Yukon River at Dawson.

To assist road transport, higher axle and vehicle gross loadings are permitted in some areas. This has resulted in lower ton/mile costs to shippers at a small increase in the maintenance costs of the highways.

There are 2,382 miles of all types of public roads. About 25 miles per year are added with present emphasis on the Dempster Highway in the northwest. Upgrading the present network to trunk standards is slowly proceeding. There are also several thousand miles of "tote trails" built by private resource developers. In 1967-69, 1,300 miles of tote trails were built with up to 50% of the cost being borne by Government.

There are increasing demands from both Canadian and U.S. users for paving the Yukon's trunk highways. All Alaskan public roads are paved.

The major expected task is the provision of permanent surfaces on trunk roads, most probably using a soft asphalt cement. There are climate problems, but satisfactory techniques and materials are being developed

Mr. J. Parker:-Our next panelist is Mr. Ron Kapchinsky who is President of Kaps Transport Limited.

PANELIST: Mr. R. Kapchinsky

I would like to touch on a few things done by our Company in the past. We own five or six of the largest tracked carriers built in Calgary; if the government has feelings about the operation of tracked vehicles over tundra perhaps we may have to scrap them. However we do have a need for them in the Fall when oil companies make use of them for road building soon after the first snowfall. This enables us to have a road in service some two or three weeks earlier than would be the case if we waited for more frost, and facilitates the operation of cat equipment which benefits from the previous passage of tracked vehicles over the tundra.

Over the last five years we have built many such roads in the North, mostly for oil companies in seismic survey and installation of drill rigs. The longest road we have built for one rig was about 180 miles, but the total in some five years is 1000 to 1200 miles of road for this purpose.

You may have noticed also that we are in the water transport business. From commencement about 1967, we have now acquired a small fleet which helps not only the oil companies but also the general economy of the North. Our base is at Inuvik. Kaps transport also built the first air-strip on Banks Island, operated by Elf Oil, which is working very well. As we are also in the catering business it will be seen that we can take care of the complete needs of any company likely to set up

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business.

One of our problems in helping to develop the North is the waiting for decision by the Federal government as to whether or not we can have a certain piece of land. There are of course only certain areas which are suitable for our purpose, but now that we are established we think it will work out very well.

I might also mention that our company cleared some 70-75 miles of bush along the route of the Dempster highway, a job which employed all available native help in the area.

Mr. J. Parker:-The panel now stands ready to field questions from the floor. I would ask anyone with a question or a statement preferably not a speech to identify himself.

SESSION DISCUSSION

DELEGATE: Mr. Peter Kirwan Canive Industries, Hagersville, Ont.

I would like to address myself to Mr. Harwood and bring him up to date that we have a thriving Canadian air-cushion vehicle industry. It is wholly Canadian made but it is not in Calgary.

In this connection I wonder whether he has figures of specifications for turning radius and heights for obstructions which air-cushion vehicles should be designed to accommodate?

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PANELIST: Mr. T. A. Harwood

The Defence Research Board provided some \$75,000 towards trials of this nature with a British hovercraft which was brought to Canada and tested. At least three reports resulted, I cannot quote the numbers, but these can be obtained.

[Ed: Discussion then followed in which mention was made of trials of British hovercraft which had taken place in Africa. The point was made that vehicles imported into Canada so far had essentially been designed for tropical conditions rather than for the Arctic.]

DELEGATE: Mr. Peter Kirwan

I agree with you. This is the problem. All the vehicles brought into Canada up to this date have all been tailored for North Africa or cross-channel or warm mud conditions. Nothing up to this point has ever been built for Canada, and this is what we are doing.

DELEGATE: Mr. J. K. Rose, Ministry of Transport, Hay River

I am employed by the Ministry of Transport at Hay River and am therefore interested in air-cushion vehicles. Having seen the passenger carrying type which is something like an aircraft, I wonder whether anything has been produced which is comparable to a half-ton truck? It would appear that the Cadillac version works well but I think that a half-ton truck equivalent would be the thing for the North.

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PANELIST: Mr. R. Kapchinsky

We are hesitant to get into air-cushion vehicles because the costs of production and operation are unknown. However we did give some thought to a trailer with sleigh runners, towed by a D-8 Cat, which allows us to haul about 8,000 gallons of fuel over tundra. This design is for winter use but we are also looking into other types and are operating an American vehicle with low-pressure tires which is called a Rolligon. This has done well in Alaska and has caused us to think also of a rubber-tired vehicle with sufficient floatation to avoid tearing up the tundra; this would be capable of operation in summer. The Rolligon is really a toy but for industrial use we think that we can come up with something.

DELEGATE: Mr. Peter Kirwan

To answer the question on the utility vehicle, we have a half-ton vehicle with a V-8 engine and two air-conditioning fans which will take about a half-ton of freight or six passengers. We also have trailers with an air-cushion assist to relieve footprint pressure. One of these vehicles, a 500 ton transformer carrier, runs at about 5 miles per hour. There is also another type of logging trailer with a capacity of 30 to 40 tons at 40 miles per hour. Here the footprint pressure is less than one pound per square inch with tire pressures of three or four pounds per square inch. The tires are necessary for stability.

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DELEGATE: Mr. Allan Grant, Pacific Hovercraft

I am from Pacific Hovercraft, operators of hovercraft. Having heard from manufacturers and others let me give some additional background. Last year we got four British hovercraft with passenger configuration for operation in the Arctic. We did geophysical work and hydrographic surveys for the Canadian Government. With a passenger hovercraft stripped and adapted for freight we found we could carry about eight tons, including at various times small Cats, fuel drilling mud, diesel engines etc. It virtually supported drilling operations this summer.

DELEGATE: Dr. N.W. Radforth, Muskeg Research

I speak as President of the International Society of Terrain Vehicle Systems. I am impressed with what has been said, particularly with the questions, and I believe that we should look for innovations.

It has been stated already that the hovercraft principle is such that, with certain modifications, a vehicle of this type could be navigated from the southern tip of James Bay to Great Slave Lake, and I stand by that statement. Rather than push things down in the muskeg we should lift them up and, in this sense, we should support every aspect of mobility which has promise. Unless vehicle design and terrain are thus associated no progress will be made.

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I am impressed with Dr. Woodward's remarks about the need for strategy in planning for transportation in this country, which will certainly involve the off-road vehicle industry. This applies not only to air-cushion vehicles and associated types, but also to tracked and wheeled vehicles. Mr. Carpentier has mentioned the possibility of advice on new legislation which the government should announce. This is very significant but I am sure that he understands that much research has to be done before recommendations can be made and regulations drafted. This is all in progress but I must emphasize that it is up to government, industry and users to plan together for both vehicles and environment in all phases of Northern transportation.

Unless we do plan a strategy suitable for the country and its terrain, and unless we pay attention to these matters, we will find ourselves bogged down in more ways than one.

PANELIST: Mr. T. A. Harwood

Although I am a government employee, I am against too many government regulations which tend to put a lower limit on development. The government is not an all powerful authority, it simply represents everyone in this room; I say then, don't make too many regulations in case we kill the goose that lays the golden eggs.

DELEGATE: Dr. N. M. Simmons, Canadian Wildlife Service

I am new to the Arctic as regards my work, but from

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what I have observed it seems to me that industry is not making as much use of off-road vehicles as they might. In some cases they are simply using or adapting vehicles designed for the South and putting them to work in the North. Although excellent specialized vehicles are available we are still using caterpillar tractors, a practice which seems to leave a few headaches.

I wonder now whether we should not discontinue the use of such vehicles, which are destructive, and switch to flat track Bombardiers or some other vehicle which might be easier on the terrain. If this is not economically feasible, are the caterpillars here to stay? Or can we, in exploration and difficult developments yet to come, do away with such vehicles?

PANELIST: Mr. R. Kapchinsky

This is one of the studies we are making now, because we really do not feel that the caterpillar way of transport is necessarily the best. But as far as wildlife and ground damage is concerned, at the time of the year in which we operate, we do so without leaving a dent because the ground is frozen.

We have heard about 'white-outs' in which snow will blow for three days in one direction before blowing the next three days in reverse; in such conditions a D-8 Cat can be driven over the resultant snow banks without even cutting them down. It was for this reason that we built the type using the sleigh runner for going through the snow in the gullies and the wheel

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on the sandhills; otherwise the sandhills would, of course, wear down the runners, possibly in less than a hundred miles.

As to damaging the environment, we operate on Prince Patrick Island, Mackenzie King Island, Banks Island and Borden Island and anyone in these places can see that we clean up as we go. Down in the South twenty years ago contractors did not operate like that but today, on Banks Island for instance, you ground; the tin cans, debris, etc., are buried, and the operation moves on without trace to the next site, perhaps ten miles away.

We follow this method throughout our work, and in this respect I think the government has taken the right steps and that they are being followed.

DELEGATE: Dr. N. M. Simmons

I have to agree with that; I was really impressed with Elf Camp but if there are any headaches about vehicles they usually arise in connection with Cats, not the Rolligon nor the Nodwell. Do you feel that, due to problems with Cats - their shoes, blades, regulations, etc., - that the Cat is in the Arctic Islands to stay, or are we now at the point where we can move away from this type of vehicle with tracks and heavy lugs which can damage hills?

PANELIST: Mr. T. A. Harwood

It is the condition of the ground, rather than the draw

pull of the vehicle or the pressure involved which makes the difference. You can have nine pounds per square inch, twenty pounds, or down to three pounds, but the ground state is the limiting factor. The making of regulations prohibiting operation in specified pressure limits is not the answer; the answer is to study the ground.

Now about wildlife which, oddly enough, is something I know about. Jets and ships and planes and tankers are not necessarily destructive of wildlife, it is guns which do the damage. Industry does not always destroy nature, and I have seen pheasants sitting on posts only nine miles from London Airport with a power station, tanks and everything else in the area. What ruins life for human beings and animals alike is shooting - they get scared just as we do.

Mr. J. Parker:- Perhaps we could have one more question or comment and then close off.

DELEGATE: Mr. J. C. Mills, Vice-Pres., & Mng. Dir., Bell Aerospace Can., Ottawa

My name is Jim Mills, Bell Aerospace Canada, and I'll exercise a good deal of restraint and not talk about air cushion vehicles. I think Peter Kirwan and Trevor Harwood have covered the thing except I would like to say that I read Trevor's paper carefully with a great deal of interest and I think that a lot

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that he has to say is certainly valid. I think perhaps he has most deliberately taken a pristine pessimistic view but this is valuable because I'm confident that in a very short time we will have resolved many of the problems with air cushion vehicles that have been so evident in the past and I mean in the short term. I'm talking about the next two or three years. I think we will be coming up, both Peter's resources and our own, will be coming up with some answers. I think we have already come up with answers to most of your problems Trevor but I think you will actually be seeing vehicles capable of 20, 30, 40-ton payloads, 30 mile an hour block speeds being produced in Canada very shortly. There is one question I would like to direct to the whole panel but I would like Ron Kapchinsky to answer me if he can. In my travels I have met people who know how and where to operate helicopters in the Arctic, I have met people who know how and where to operate aeroplanes in the Arctic, cat trains, tractors and trucks, ships, barges, tugs, icebreakers and so on but all of these people, whether they are in government or private industry, I use the term advisedly, they tend to be prima donnas, they know their own business but nobody else's. Now I think probably Ron Kapchinsky's company is one that has begun something that I think is very badly needed in Arctic transportation. People have been talking this afternoon about this vehicle and that vehicle that should be designed for the North as if we are going to come up with some ultimate panacea

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that's going to solve all Arctic problems. Right now technology has vehicles that are ideal for the North. We have aircraft, we have tractor trains, we have Rolligon type vehicles. We have air cushion vehicles. All of these in their own place can do a good job but I don't see any place or any suggestion as yet of a way in which all of these vehicles can be combined into a system that can be efficiently used. How can we, to the best extent, efficiently utilize all the various forms of modern technology in transportation?

Mr. J. Parker:-I think your question is pretty broad. You have asked the panel how best the whole technology of transportation is to be used in the North. Well I think that co-ordination could be the subject of another complete panel. I wonder in view of the late hour if you could perhaps ask this during the cocktail hour tonight. I am sorry to close off like that but I think we have run as long as we should. I think our panelists have served us very well. They have put forward different points of view. The response from you people has been excellent, I compliment you on your questions and your responses. Further discussion would undoubtedly clarify all the various points of view but time does not permit this today. I do thank you for your attention and I do thank you panelists for the most excellent presentation.

SESSION 4B
WESTERN WATER TRANSPORTATION (INCLUDING EFFECTS OF BUILDING
A MACKENZIE VALLEY PIPELINE)

CHAIRMAN: Mr. W.M. Gilchrist, President, Northern Transportation
Co. Ltd.

PANELISTS: Mr. L.R. Montpetit, Exec. Vice Pres., Northern Trans.
Co., Edmonton
Mr. R.F. Allan, Pres., Robert Allan Ltd., Vancouver
Mr. J.C. Underhill, Corporate Frontier Coordinator,
Imperial Oil, Toronto.
Mr. B.F. Willson, Pres., Cdn. Betchel Ltd., Toronto

CHAIRMAN'S OPENING REMARKS

Mr. W.M. Gilchrist:-To understand the problem of transportation in the north and the part that movement by water can, and does, play, not only in the western Canadian Arctic, but in the solution of the total problem, it is necessary to have:

- (1) a clear picture of what we are trying to achieve;
- (2) a fair knowledge of the characteristics of the tools available.

It is also very useful to know something of what has happened in transportation in the North since the turn of the century, and the solutions provided for the various problems that have been solved in that period of time. Such information is of considerable aid in forming sound judgments and making decisions in regard to the situation that faces us today. Although it may not appear to be relevant, it is frequently very helpful to have some knowledge of why the Yukon and White Pass railway came into existence and the problem it solved as well as how transportation was handled in the early days of

the Flin Flon operation, in the central Manitoba and Red Lake mining districts, in the mining developments of northwestern Quebec and Labrador, and finally in Bear Lake, Yellowknife and Beaverlodge, and how the early situation compares with conditions as they exist today, for today's operation is the child of yesterday's activity. It must always be kept in mind that the basic conditions of distance, terrain, weather, etc., remain the same. Frequently it will be found that many of the seemingly very difficult situations that exist today have been successfully handled before by rather simple methods.

What is our objective?

(1) Dependable transportation for the established industrial activities and communities, dependable aid in the maintenance of certain government and military activities, and dependable support for the rapidly expanding search for oil and gas, and mineral exploration in general;

(2) Do the job as economically as possible. Transportation is a service industry, and it can exist only as long as the activities on which it is based remain economically viable or are required by our society.

Dependability is placed above cost in order of importance for non-delivery can lead to human hardship and financial disaster, since it may not be possible to effect delivery again for many months. Hence, dependability takes precedence over all else.

Referring now to the second fundamental point -

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"a fair knowledge of the characteristics of the tools available".

The most prominent characteristic of northern transportation is that it is almost always a mix of the various existing modes. Seldom, if ever, is the transportation element of any activity in the north provided by a single method of movement. Practically always it is a combination of air, ground and water, and the most efficient system is the mix that produces the lowest cost, commensurate with reliability, and the major element in this mix may be air in one particular set of circumstances, ground in another, and water in a third.

In assessing what role water transportation can play in the total movement of people and material in the Mackenzie Basin, the western Canadian Arctic coast and the Arctic archipelago, a glance at the map will provide at least some indication of why tonnage being moved by water has increased so rapidly during the last two years, or since the discovery of important oil and gas reserves at Prudhoe Bay on the northern coast of Alaska, and significant gas and oil occurrences in the Mackenzie delta and the Arctic archipelago. The Mackenzie River cuts through almost the centre of the area where, from the geological information available, significant reserves of both oil and gas could be developed, particularly in the area of the river's delta and along the Arctic coast to the east and west of that point, and off-shore in the same area.

The Mackenzie system also reaches into a number of

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metal mining regions which include Lake Athabasca, Great Bear Lake and Yellowknife, where in spite of an all-weather road, water transportation still accounts for over 50% of the resupply tonnage. It also appears that this system will provide the most economical route for moving in the heavy equipment and bulk shipments for the new uranium development west of Wollaston Lake in Northern Saskatchewan.

To state the foregoing rather more simply, this river provides access by marine equipment from fairly deep in the interior of the continent to any point on the Arctic coast between Point Barrow and Spence Bay on the west coast of the Boothia Peninsula, and to the southern islands of the Canadian Arctic archipelago, as well as many points in the actual drainage basin.

The flexibility is rather startling, when it is realized that it is possible to load a barge at Hay River and have the freight delivered without trans-shipment, very close to any point on the Slave River below Fort Smith, any point on the shore of Great Slave Lake, any point on the banks of the Mackenzie, almost any point in the delta, any point on the Arctic coast between Barrow and Spence, and any point on the southern coast of Banks and Victoria Islands, up the Bear River as far as the first rapids and a fair distance up the Peel and the Red, and all, as stated, without trans-shipment, provided the barge used is of the design required for the channels it will traverse during its passage. In the tributaries it must have a very shallow draft. If the

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destination is some point along the Arctic coast or in the Islands, size and strength are important. The same is true for the upper part of the system, which includes Lake Athabasca and the Athabasca and Peace Rivers. Here the starting point is Waterways.

The great disadvantage is, of course, the relatively short period of open water, which varies from 75 days along the Arctic coast to 150 days on Lake Athabasca. This fault is offset to some extent by the tonnage that can be handled in a relatively short time. At high water, 6,000 to 8,000 tons can now be handled over most of the river between Hay River and the Arctic coast in one train of barges, and with some improvement to the channel, 10,000 tons in one train could be handled quite easily at any time during the shipping season, or a tonnage of freight approximately equal to what can be carried by a two-hundred-car freight train. The distance by water from Hay River to the Arctic coast is approximately 1,100 miles.

The first paper will be presented by Mr. Lionel Montpetit executive vice-president of Northern Transportation. Mr. Montpetit.

WATER TRANSPORTATION ON THE MACKENZIE RIVER SYSTEM & THE WESTERN ARCTIC
BY: MR. L.R. MONTPETIT

SUMMARY

The paper by Mr. Montpetit discusses the future of the Mackenzie River as an inland water route and reviews the capability and services presently offered by its main operator, Northern Transportation Company Limited. This Company, the only common

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carrier in the area to provide regular service on the Mackenzie River and Western Arctic coastal routes, currently operates a modern fleet of 27 diesel tugs, two coastal ships, and 142 dual purpose barges. It maintains two receiving depots connected by rail and roadways at Waterways, Alberta, and Hay River, N.W.T., and during the navigation season supports fully integrated agencies having camps and terminals at Bushell, Saskatchewan, and at Norman Wells, Bear River and Inuvik, N.W.T. For coastal distribution a modern trans-shipping base is operated at Tuktoyaktuk, including a floating drydock capable of providing complete marine repair and inspection services. To complement the overall operation, ship construction and maintenance facilities are located at Hay River, Fort Smith and Waterways. The company owns and maintains approximately 4,000 lineal feet of steel-faced wharves and provides employment to some 650 employees during the peak of operations. In 1970, it carried some 275,000 tons of dry and bulk cargo.

Water transportation has and is pioneering the opening up the Mackenzie Delta and it will undoubtedly continue to be a most important method of freighting goods north of the 60th parallel. Nevertheless, it forms only a part of the total transportation complex, and a balanced and rational approach to all practical transportation systems is required so that the benefits of any one mode are not lost or deferred because of the demands of any other.

While serious drought conditions have persisted through-

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out the Mackenzie River drainage basin over the past few years, there are only five small sections of the river that are considered to be a constant hindrance to efficient water transportation.

These are: Beaver Lake, Providence Rapids, Green Island Rapids, Sans Sault Rapids, and The Ramparts. Although the rock-formed rapids of the Sans Sault with its fast waters, now under improvement, have so far imposed the most serious navigation difficulties and extreme operating hardships, the real capacity of the equipment and the river system is dictated by channel conditions in the first three sections mentioned. The difficulties encountered meant that during the 1970 season, even considering high water periods, the maximum draft achieved was only about 60 per cent of the design capacity. It is, therefore, now believed that investment in river channel improvements (estimated at \$16 million over a three-year period) would be more productive per dollar spent than further expenditures in adding new equipment to overcome the lack of river improvements.

Mr. W.M.Gilchrist:-Now I'd like to call on Mr. Bob Allan, Robert Allan Ltd., naval architect of Vancouver. Mr. Allan has been involved in partnership for a good bit of a time with his father in the design of many ships now plying the west coast and he's become extremely interested in and extremely helpful to us in the last year in dealing with our problems on the Mackenzie. Mr. Allan.

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CURRENT DEVELOPMENTS IN DESIGN OF TUG/BARGE TRANSPORT
FOR THE MACKENZIE RIVER BY: MR. R. F. ALLANSUMMARY

The paper by Mr. Robert F. Allan, President, Robert Allan Ltd., Naval Architects, is essentially a technical document which provides background information relating to the Mackenzie River and discusses the barge flotilla and possible measures which might be taken to increase tonnage put through. Also dealt with is the question of towboat design and some modern innovations, including the design of the latest addition to the Northern Transportation Co. Ltd. fleet, the M.V. "Vic Ingraham", a 4,280 SHP vessel having a 42 inch Mean Draft and capable of handling six rather than the usual four barges.

In his introduction, the author states in part as follows:

"The Mackenzie River is now and is likely to remain a great natural route for the transport of bulk commodities and general freight. It is difficult for navigation, the operating season is short and, consequently, freight rates are high. At present the only alternative is air transport but it is to be anticipated that eventually road and rail transport will reach out and provide keen competition. At the moment the basic problem is movement of tonnage but in the future freight rates and consequently efficiency of operation will be of increasing importance. Both problems, that of increasing tonnage, and that

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of improving efficiency, relate to current developments in tow-boats and barges."

In his conclusion, Mr. Allan makes the following observations:

"The performance of the quadruple screw tunnel tow-boats constructed in 1969 and 1970 was indicative of a major breakthrough in navigation on the Mackenzie. We are optimistic that the performance of the "Vic Ingraham" will be a further step forward. It seems now practicable to operate tows in the order of 9,000 tons potential deadweight and further extensions are possible. Whether or not this should be the direction of development remains to be seen. If the river should be sufficiently improved to permit operation at deeper drafts, the trend possibly will be to large units; however, we shall anticipate that in the future a closer scrutiny of system economics will be applied towards establishing optimum flotilla size and motive power."

Mr. W.M. Gilchrist:-Thank you Mr. Allan. Now our next speaker Mr. Underhill, has been employed within the last ten years in Imperial Oil's activities in the Arctic, and he is now completely engrossed in the planning of the Arctic as far as that company's operations are concerned. He has the title which I am going to repeat here not in fun but it is the first time I've ever come across it - The Corporate Frontier Coordinator. Mr. Underhill.

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THE ROLE OF THE MACKENZIE RIVER WATERWAY IN OIL EXPLORATION
BY: MR. J.C. UNDERHILLSUMMARY

This paper by Mr. J.C. Underhill, Corporate Frontier Co-ordinator, Imperial Oil Limited, deals with oil industry use of the Mackenzie River, possible future requirements and suggested means of improving navigation efficiency. Among the points raised are the following:

1. During the past navigation season the oil industry shipped approximately 150,000 tons of cargo down the Mackenzie via N.T.C.L. and Kaps Transport at an average cost of about \$100 per ton. While expansion of the present tug and barge fleet is taking place to accommodate a moderate tonnage growth, if there is a sudden and large increase in tonnage, such as may be anticipated with a major oil development program and a proposed pipeline system, the facilities would not meet the requirements;

2. The assembling of all oil industry requirements in aggregate indicates an increasing demand for river transportation which could total 450,000 to 500,000 tons by 1973 or 1974. This total is over three times that of 1970 and could be very conservative although it does depend on the assumption of successful exploration. Over and above these requirements would be the escalated river transportation needs of the local communities. To meet all projected needs, the Mackenzie River transportation facilities must be expanded either through additional equipment, improved efficiency or a combination thereof. It is not the

responsibility of any one group to add to this capacity. The transportation companies and the oil industry shipping companies are strongly urged to jointly study the entire transportation system with a view to identifying and taking action to reduce or eliminate the most serious problems while at the same time pointing out individual responsibilities;

3. To meet the forecast needs, major improvements must be made through the co-operation and co-ordination of industry, the transportation companies and government agencies. The role of government would be to:

- Improve the river itself by dredging the present shallows to allow maximum barge loading for the full season. The present work at Sans Sault should be extended and speeded up;
- Provide improved navigation aids to allow river pilots to operate safely at night, even in shallow water conditions;
- Improve the port facilities at Hay River or possibly extend the present rail line to Fort Providence and develop a new major port. This would lengthen the navigation system into the period where the Mackenzie River is free of ice but Great Slave Lake remains ice clogged.

Mr. W. M. Gilchrist:-Thank you Mr. Underhill. I hope some of my friends and acquaintances in Ottawa noted those figures. I

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am a perennial dreamer down there as far as transportation on the Mackenzie is concerned, particularly when I mentioned the figures that I dared to put forward. So far none of them have equalled any of those. Thanks for the assistance. Now I would like to call on our next speaker, Mr. Bruce Willson. I think most of you know him. He is President and Director of Canadian Bechtel Ltd. and he will talk to you about the possibility of pipelines now in the Mackenzie and some of the work that has been done to date. Mr. Willson.

CURRENT OUTLOOK FOR PIPELINES OUT OF THE ARCTIC
BY: MR. B. WILLSON

SUMMARY

This paper by Mr. B.F. Willson, President, Canadian Bechtel Limited, provides a comprehensive review of current North American Arctic oil, natural gas and pipeline prospects. The salient points raised in it are as follows:

1. A start will be made on the construction of the Trans Alaska Pipeline System in 1971 with completion some time in 1974;
2. A Mackenzie Valley oil pipeline is some distance in the future - the timing will be entirely dependent on future Canadian Arctic discoveries;
3. A large diameter pipeline bringing Prudhoe Bay gas reserves to U.S. markets is not economically feasible until there is available for transportation from Prudhoe Bay, or from

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other northern areas tributary to such a pipeline, volumes in the order of 2 billion cubic feet of gas per day assured for at least a period of twenty years. Development of substantial additional amounts of gas (preferably from fields not associated with oil production) will likely be necessary before an Arctic gas line can become a reality;

4. The growing shortage of gas supplies, together with the substantially higher cost of finding, developing and transporting northern gas to the major market areas will add significantly to the delivered price which consumers will pay in the future. At the same time, the inherent advantages of natural gas as a fuel will enable it to command a premium price in the energy market.

The author concludes by stressing the great potential of the Arctic but emphasizes that this potential can only be realized through the combined efforts of Canadian and American industry working closely together under "enlightened" government sponsorship and regulations.

Mr. W.M. Gilchrist:-We have a bit of time to hear from Mr. Willson on his trip to Russia. I suggest we hear from him first and then have the discussion period.

PANELIST - Mr. B.F. Willson

Six of us from the Bechtel Organization went to Moscow then to Siberia on October 21st. Primarily we wanted to learn

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what the Russians were doing in the area of permafrost research. We knew that they had considerably more extensive research with this type of problem than we have in Canada. We were anxious particularly with the design of Arctic pipelines and to become as current as we could on the Russian experience and apply their knowledge to the benefit of North American pipelines. The second thing we were interested in was the possibility of a gas pipeline from North Eastern Siberia to Japan where Japan is in need of increasing quantities of energy and the Russians are making prodigious discoveries of oil and natural gas. We wanted to learn more about North Eastern Siberia so we did go to the city of Yakutsk which is a city of about 60,000 people in North Eastern Siberia about latitude 62° which is the same as where we are here in Yellowknife and it's about straight north of Korea. It's about 45 hundred miles east of Moscow.

I might just say that we were very impressed with what the Russians had accomplished. Their political system seems to be working very well, they have a dedicated people. They are doing things in their Arctic that really stagger the imagination. Some of the hydro-electric projects are even larger than Churchill Falls and the aluminum plants, pulp and paper mills are really of major significance and major size.

The Russians were incidentally very friendly. They were keen to tell us what they were doing. They seemed to go out of the way to answer all our questions. They were anxious to come back

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to Canada and the U.S. to learn about how major engineering projects are organized, how the construction is organized, what methods of construction are used. Generally speaking their work is not up to the standards of North American projects. Their craftsmen don't seem to have the same degree of skills that our people have. But of course we have a much greater tradition in the crafts than they have. But I was impressed with what they have accomplished particularly in hydro-electric production.*

SESSION DISCUSSION

Mr. W.M. Gilchrist:-Thanks a great deal Mr. Willson. That was very instructive. And now gentlemen, have at it, if you will.

DELEGATE: Mr. John Roberts (Hay River)

I would like to question Mr. Willson. I would like to know if anything is being done to assemble information on behalf of the study group on the transportation and other services that are available in the Northwest Territories and to document them so that they shan't be overlooked in the development of the pipeline and the development of the oil industry generally in the North. The business man in the North is most anxious to be able to take part in this tremendous operation which is about to take place in the next few years. Thank you, Sir.

*Editor's Note: Mr. Willson concluded his talk with the aid of colour slides.

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PANELIST - Mr. B.F. Willson

Mr. Chairman. If I might just refer that question to a gentleman in the audience, Mr. Hurd who is president of Trans Mountain Oil Pipeline Co., and also President of Mackenzie Valley Research. We also have Mr. Roger Clute of Inter-Provincial Pipelines. Both of these gentlemen are more knowledgeable to answer this question than I am..

DELEGATE - Mr. G. C. Hurd

Bruce if my voice will hold out I will try. We certainly will do more than we already have in terms of seeking out knowledge as to all the services that are available. Obviously logistics becomes a very important factor when you are talking about a pipeline of this magnitude. Up to this time we have concerned ourselves mainly with the technology, to make sure we find out how to build a pipeline that will be a good safe pipeline and that will not wreck the environment. Our work is broadening now into the human factors and all the things that have to do with animals and plants and the whole of the environment. But certainly logistics will be important and this will be researched to the nth degree I can assure you.

DELEGATE - Mr. R.H. Clute

I don't think there is very much to add to it, Mr. Gilchrist. I think Mr. Hurd has covered it very well.

DELEGATE: Mr. M. Brochu

For those who are interested in the maximum utilization of navigation on the Mackenzie, I would like to briefly point out that the method used by the Russians on the Lena, the Ob and the Yenisey, which I described earlier, used during the break-up in the spring time notably on the three above rivers could be used with equal profit on the whole length of the Mackenzie and also on the navigable lakes which form part of the Mackenzie Waterway System. It seems to me that the use of this method would increase the navigation season by a minimum of 15 days and from 3 weeks to one month where the depths of the water is maximum and the daylight period is also maximum. I believe that it would be worthwhile to try this method. Again I would like to say that this is not a theoretical suggestion but one that has had practical and successful application in Russia.

The Russians also used this method for flood control of the estuaries of the major rivers which were in the past subject to catastrophic inundations. I don't see why this could not also succeed on the Mackenzie and it would not affect the navigability of the waterway during the best navigation season.

Mr. W.M. Gilchrist:-The suggestion is made that we should try the Russian method that was suggested in the previous discussion

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in order to increase the navigation season on the Mackenzie by at least 15 days to possibly a month. We certainly are interested in this and will look into it.

DELEGATE: Mr. C.K. Hurst, Director of Engineering, Dep't of
Public Works

I would like to make a few comments on the improvement of the Mackenzie River. First of all I am not sure whether you are aware of the fact that the Federal Government now spends annually somewhere between half a million and three quarters of a million dollars in maintaining the river navigation channels, and that this, in terms of the present traffic I would suggest, is between one and two dollars of subsidy per ton of freight. The Northern Transportation Company asked us to estimate the cost of improving the river in some 32 different locations. The cost I think was 16 million dollars. I think that Mr. Montpetit mentioned that figure. This was an estimate based on very little information so that I suggest 16 million dollars give or take 25%. Based on a 10% cost of money this would bring it down to 1.6 million dollars a year plus the half a million maintenance that we carry out now. If you consider the fact that part of the 16 million, which would be capital, would be used in deepening certain areas of the river, which are already of a gravel or sand type, this would further increase the cost. The total cost then would be over two million dollars annually for the maintenance

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on the Mackenzie River to achieve the improvement of a 8' clear channel. Now I think that this is a fair amount of money and as engineers we would just be delighted to do this. I think we also recognize that transportation is heavily subsidized almost all over the world. I don't think any port or any river system actually pays for itself so the economics of the situation is not the governing factor.

I think that of course the future of the development of the Mackenzie River would certainly have to depend on the Ministry of Transport. There is one thing I would like to add though that very little real information is available on the Mackenzie River although people have been going down it for years. There is very little information about how the river is going to react if we start changing it. I think one of the first things that have to be done is to spend two or three million dollars in really a serious investigation of the Mackenzie River System, the Mackenzie River itself, the hydraulics of it, the hydrology of the system, and what the bed of the river is like. All this should be done regardless of what happens to the Mackenzie, because this wonderful river is one of the major resources of Canada. I think if it was in any other country particularly our friends to the South or in Europe with a major resource like the Mackenzie they would certainly know a lot more about it than we know about the Mackenzie itself.

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UNIDENTIFIED SPEAKER

I would like to add this remark to that and that is that time is running out and we had better get on with it.

DELEGATE - Mr. O. Watsyk; Fort Simpson Council

We feel that water transportation could be improved three weeks simply by moving the operation from Hay River to Fort Simpson. It's simply done. You don't have to go to Russia, just come to Simpson. The other problem that was mentioned here is railroads. Now there will be a railroad built up in B.C. Should it come from Hay River to Simpson or from B.C. up to Simpson? The mileage I think is almost equal to, the benefits along the Liard route. Railways would be a benefit to the harvesting of the forest potential and the mining potential out of our area. These have been looked at casually and not documented at all.

Mr. W.M. Gilchrist:-The ideal site for a railway terminus is Mills Lake. But we are at Hay River, and the pressure of time and the pressure of events is such that I am afraid that for the foreseeable future we will have to stay at the Hay River Terminus. It has its disadvantages, but it has its advantages now. We are established there and to try and uproot our installation now can not even be contemplated at the moment, and for a long period of time in the future. Next question please.

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DELEGATE: Dr. Trevor Lloyd, McGill University

Mr. Chairman, Gentlemen I just want to intervene briefly. I feel a bit of a Methusela in the matter of the Mackenzie River. Back in 1943 another pipeline, a 4" pipeline was being built from the Mackenzie River or near it. As a result of having spent 4 or 5 months studying the river, I published a couple of articles in 1943. One of them aided the Mackenzie Waterway and Northern Supply route. So you can see why I feel a little like Methusela intervening at this stage. One of the things we did, not long afterwards, was to attempt to get the Dep't of Public Works in Ottawa to show some interest in improving that great waterway. I was very glad indeed that in 1970 the message has finally gotten through. It is only going to cost a small amount of money but it would have been a lot cheaper in 1945. I think sir that this conference should go on record as urging all appropriate government and private agencies on the importance of establishing now once and for all that great river as a northern supply route. I might add Sir that in 1943 the tonnage was 12,000 tons. I do have one question regarding the great expense of moving all the ships southward for 12 hundred miles carrying no cargo at all. I wonder if anybody can suggest to us the likelihood that any return cargos are likely to materialize in that valley that would help to reduce the rates.

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PANELIST: Mr. L. Montpetit

We are presently studying all kinds of return shipments. However it must be realized that the operation up river is about twice as long as down river. Once you apply the power coming back south with loaded barges you run into other problems which mean that the economics is not as good. However, we are looking into this and obviously within a short time we will be doing some major changes in our approach to return cargo. It's all a matter of economics. People will ship goods south providing we want to sort out the transportation costs. It's a matter of proportioning this.

DELEGATE: Mr. J.B. Garvie; Federal Commerce and Navigation Co.

I would like to direct this question to the two gentlemen of Northern Transportation. When and if the Prudhoe Bay TAPS pipeline is constructed and with it the service road completed, do you visualize the reverse trend in the movement of cargo from Prudhoe Bay to the Mackenzie Valley area or to the Banks Island area? That is, moving the cargo from Valdes to Prudhoe Bay and thence by barge from there to the Banks Island or through the Mackenzie Valley system.

Mr. W.M. Gilchrist:-The road from Valdes to the Slope (Prudhoe Bay) will undoubtedly take away certain tonnage. Shall we say the package freight? No question about that, that will go by

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road. Your bulk shipments say cement, mud and things - this and perhaps your pipe and so forth, will likely stay with the barges because the differential, as yet anyway, is such that the competition between water movement even when it is only for a matter of up to 75 days along the coast has got quite an advantage. And when you are getting down to that point, beyond the wild eyed development stage, you are down to the dollars and cents. The dollar will have more value, the dollar saved will be more important, and the fact that there will be more people with a great deal more knowledge regarding the Arctic conditions, and shipping along the Arctic coast by that time will also be important. The advantages of the Mackenzie Waterway will, I believe be more readily recognized and therefore I don't think the road will take all the river traffic.

SESSION 5A
ICE INFORMATION, MARINE NAVIGATION
AIDS AND TERMINAL FACILITIES

CHAIRMAN: Mr. W.J. Manning, Director, Marine Works, MOT. Ottawa

PANELISTS: Mr. J.N. Ballinger, Associate Dir., Marine Works Ottawa
Mr. F.W. Benum, Chief, Cdn. Meteorological Service Toronto
Mr. J.D. Garvie, Gen. Manager, Fed. Commerce &
Navigation Co., Vancouver
Cmdre O.C.S. Robertson, Northern Associates Ltd.
Montreal

CHAIRMAN'S OPENING REMARKS

Mr. W.J. Manning:-I don't think I need to introduce the panel here. I think everybody has met everybody and I am on strict orders to keep to the clock so I'll pass along the opening of the discussion to Mr. Ballinger who is the Associate Director of Marine Works and who has been my right hand for a number of years. Mr. Ballinger.

MARINE NAVIGATION AIDS AND TERMINAL FACILITIES
BY: MR. J.N. BALLINGER

SUMMARY

The section on Marine Aids to Navigation outlines some of the difficulties involved when navigating in the Arctic and suggests they are not insurmountable if the navigator accepts that "unconventional methods are required to meet unconventional situations".

A brief review is made of the marine aids which have been placed in the north and covers visual, audio, and electronic devices.

ICE INFORMATION & MARINE NAVIGATION

A short assessment is made of the need for Arctic marine aids particularly in the area of the Northwest Passage. This need is related to the findings of the JOHN A. MACDONALD and the MANHATTAN during their recent probes into the Northwest Passage. The need for devices such as Loran, Decca, Omega or other electronic devices of the same nature is considered. There is a resume also of the new devices and assessment of new equipment which the Ministry is looking at to improve the aids which are being provided and the service that they can give to the mariner.

In the area of terminal facilities the present system of administering harbours in Canada is covered. This is followed with a listing of the facilities in both the western and eastern Arctic and some of the difficulties that have been experienced with these facilities. Suggestions are made of the areas where further research and study are required to ensure that facilities which are built will be able to withstand the forces of nature.

In both the area of Aids to Navigation and Marine Terminal Facilities, the need for closer discussion and exchange of information between both Government and user is apparent.

Mr. W.J. Manning: Thank you Mr. Ballinger I now pass the microphone to Mr. Benum of the Canadian Meteorological Service, the next speaker.

ICE INFORMATION & MARINE NAVIGATION

ICE INFORMATION SERVICES IN THE ARCTIC, BY: MR. F.W. BENUM
SUMMARY

The paper shows the need for ice information as it affects shipping, aircraft landing on ice, and overwater surface routes. The need for more research and better communication of information is emphasized together with the need for closer co-ordination between all agencies who are now involved.

A major objective of the C.M.S. will be to concentrate on the provision of ice information affecting large bodies of water. Present problems are:

- (1) More detailed and frequent observations needed in difficult ice;
- (2) Insufficient quantitative information on climatology (history) of floating ice, its formation, motion and dissipation;
- (3) No central clearing house for data;
- (4) Longer range forecasting needed;
- (5) Need to better utilize present data acquisition facilities.

The know-how is available to solve most of the above problems and a suggested C.M.S. Ice Information Service re-organization is suggested, to include the following elements:

- (a) Form an Ice Climatology Unit;
- (b) Form an ice data advisory and clearing house capability in Ottawa;
- (c) Change data collection from visual observation to aircraft

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mounted automatic sensors.

Mr. W.J. Manning:-Thank you Mr. Benum. I will pass the microphone to Mr. Garvie.

TERMINAL FACILITIES IN THE ARCTIC, BY: MR. J.D. GARVIE
SUMMARY

This paper outlines Arctic conditions and essential requirements of a terminal. Known suitable sites may not be within reach of the resource yet to be found and developed. Temporary terminal facilities would be located close to the produce and supported by permanent facilities. Industry may supply special facilities for their own product.

Arctic construction and operation of a terminal presents special problems involving ice conditions and permafrost. These should be resolved on the basis of known experience and not on innovation, and the pooling of expertise from all possible sources is essential. The Eskimo, who can be adapted to fill the labour requirements, would be the eventual solution to overcome the resistance of labour forces to live and work under isolation, extreme cold, and darkness, prevalent in the North.

The extremely high cost of terminal construction and operation requires Government support. Planning is essential to prevent the industries' tendency to disregard nature's contribution in its haste to succeed. Guidelines must be instituted

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and enforced by Government.

Mr. W.J. Manning:-Thank you very much Mr. Garvie. Personally I would agree that there is a need to review some regulations. I will pass the microphone over to Commodore Robertson.

ICE INFORMATION, MARINE NAVIGATION AIDS AND TERMINAL
FACILITIES, BY: COMMODORE OCS ROBERTSON

SUMMARY

This paper was written from the mariner's view-point outlining desirable specifications for vessels, crews and navigating equipment in Arctic waters impeded or restrained by ice. It also lists the requirements for ice and weather information, ice-breaker support, navigational aids, charts, etc.

It recommends the use of cargo vessels that can navigate in the expected ice conditions without ice-breaker attendance and the recognition of this capability by the underwriters. In particular it suggests that an ice-breaker patrol service, rather than an escort service for each vessel, should be available to be called upon only in the event that a vessel runs into severe difficulties.

Regulatory provisions are recommended to prohibit inadequately equipped vessels from entering ice infested waters, proposing rigid standards for strength of vessels and their power plants. It demands that ships employed in this trade be

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manned by ice-knowledgeable people whose certificate should be subject to re-examination on a regular basis in much the same way that aircraft pilots' certificates are re-examined and also that they should be examined to determine whether they are keeping abreast of new technologies and methods related to their trade.

It proposes that where possible, one system of shore-based aids be installed that can serve both ships and aircraft that provide the ice reconnaissance essential for the economic use of the ship.

Mr. W.J. Manning:-Thank you Commodore Robertson. This question of terminals came up in a number of the papers that have been given to all of you. I think with the new system for the administration of ports and with the up-coming policy for port installations in the Department of Transport in the future and having that budget under the control of the Department of Transport, we may be able to give more attention to terminals than we have in the past. The hydrographic information we have is not complete enough to make decisions. This is being corrected by the hydrographic service who are extending their surveys in the Arctic. I will show four sketches of latest charts which will show the soundings taken around the entrance of MacKenzie. These you can examine during the intermission. There is a lot of information to be obtained from

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the Eskimos. When they navigate these waters in their kyak they have to know the currents. They know where the obstructions are. They know where the eddies are. I remember old Captain Bernier who was a pioneer there. And every time you talked to him he stressed he could not have survived if he hadn't used the Eskimos as pilots. In the last few years I have not been as close as I used to be on these matters but I don't know that we are using the Eskimos and their knowledge to our advantage and I would suggest that maybe the new Arctic administration in the Department may look at this. I now give the floor to questions and discussions.

SESSION DISCUSSION

DELEGATE: (Unidentified)

I am wondering if somebody could go a little deeper into this question of Resolute as a good or a poor terminal. I have heard Mr. McLaughlin speak on the pro side to some extent.

PANELIST: Cmdre O.C.S. Robertson

It's significant that Mr. McLaughlin makes the statement he is satisfied with Resolute because he is in the air side of the Department of Transport not with the Marine side. Now if you want to talk in terms of Marine whether or not it is good,

bad, or indifferent, nothing is good in the Arctic but it is better than most. There's one problem we have there and that is the ice that flows down Wellington Channel and then becomes a moving vehicle depending on the wind and currents. If the wind is adverse it backs into Resolute. But I maintain that Resolute should be made into a transfer terminal because in the north-east side of the bay it is sheltered about 95% of the time. I could suggest other areas which would be more beneficial to us as far as the sea lift is concerned. But as Resolute is there we are not going to fight City Hall all the time. I think you must realise how Resolute was established. What we're up against now is terminal selection. Most of the Arctic ports were not selected they came by chance. They were either selected by some guy in an aircraft who was never on the ground. Resolute was actually established by chance. They were trying to establish a weather station somewhere in the Dealy Island-Bridport Inlet-Winter Harbour area of Melville Island. On the way back the fellow in charge saw an indentation on this coast. He says: "Cripes we got to get rid of the cargo. Stick it ashore there." And that's how Resolute was started. It was not picked as a distribution centre. It just grew like Topsy. Now, the port itself has many disadvantages. For one thing the ice moves in. However, in the last couple of years D.O.T. have looked at it. When Resolute is shut with ice, Allan Bay is open and they built a 3 mile road. Now if you get shut out of Resolute you take your ship around to

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Allan Bay. At least you can get your cargo ashore. It is not an ideal place for a major distribution or transfer point. The bar at the entrance of the bay will not admit big ships.

DELEGATE: Cdr. R.D.C. Sweeny, H.Q. Northern Region, Ottawa

I am not a submariner but I do have some service experience in sonar and in hunting for submarines. I'd like to question Commodore Robertson on a statement. In your paper regarding your original opposition to the submarine transport concept being based upon the military submarine which to use your own words is "speedy, highly manouverable and completely unsuited" for work in the shallow waters of the Canadian archepalego. I submit Sir that a small nuclear tactical submarine would be much happier in shallow waters ice covered as long as it had a good ice protection sonar set than would a big fleet ballistic submarine due simply to the difference in size and momentum. Going on, I would think that either of those would be infinitely happier in the same waters with the same sonar than would a 900 foot long 85 foot thick 1/5 million ton beast proceeding at anything over 2 or 3 knots.

PANELIST: Cmdre O.C.S. Robertson

Well, I didn't say that these waters should be denied to the short smaller tanker craft. The highly manouverable, high speed submarines can go through the Arctic. We've already demonstrated that. What I have been opposed to is the use of

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the large cargo carrying submarine. Now you talk about the monsters, the surface craft. The oil carrying submarine is also a big monster the thing is 173,000 tons (the one that's under design is 140 foot by 85 foot across the nose). It's an enormous thing. It compares with the surface tanker. I was opposed to it because at the time I served in nuclear submarines under the Arctic ice, we did not have the buoyancy control that they now have. Now you can take these large ships without the fluctuations in depth. Their very design makes them more stable. They are slow. When I talk about slow, I mean 16 knots as opposed to 30 knots plus. You're talking about a different vehicle. My other objection was that the bathymetric data that we had was insufficient and so doubtful that I wondered if they could get through. However, the oceanographers proved pretty conclusively before the hydrographers that the channels were deeper. You've got a channel so big and so deep. A certain amount of water is going through it. This they have measured. You couldn't get that much water through a shallow channel. This channel had to be deeper and so they went out and found that the channels were much deeper than we had been led to believe. Much of the problem was that we had insufficient knowledge.

DELEGATE: Cdr. R.D.C. Sweeny

Sir if I may go on. I took your 170,000 tons and added the steel of the submarine and said that's 1/5 million displacement.

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My point Sir is this, Recently I was told that in recent tests of a super tanker in Britain when they simulated power failure the tanker still had perceptible way on her 24 hours after her engines were stopped. Now the ice navigation sonar used in the military submarines are all very good. They are very good at the ranges required but to my knowledge nobody has yet designed an ice navigation sonar set that can reach out to 24 hours away from where you stopped your engines and give you any sort of factor.

PANELIST: Cmdre. O.C.S. Robertson

Why go for 24 hours? If you get a power failure you come to the surface. All you have got to do is blow tanks. Even in mid-winter and I've done it. I've been in submarines up to the North Pole. About every thirty miles you will find a lead or a pressure ridge. This is a matter of statistics. These beasts can break 5 foot of ice plus. If you will just look at these, the ice thickness lines, undisturbed one year ice, there's a lot of it around. You can find, within a thirty mile radius, a place you can break through. So you come to the surface. You just don't go cruising for 24 hours blindly.

DELEGATE: Mr. C.W. Hurst, Director of Engineering Planning,
Department of Public Works.

We've learned a few things this morning about the

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requirements for terminals in the eastern and western Arctic. I might just add a comment about the work we have been doing over the last year in trying to establish the feasibility of a terminal particularly in the Herschel Island area and east of there. I thought that Mr. Garvie's assessment of this as just an academic exercise in his paper but I think it's much more than that. The work that's being done will answer some of the problems of building such a facility in the Arctic regardless of whether it was in the Herschel Island area or eastern Arctic or further west. And one of the things we have found and I think that this bears out with what Commodore Robertson was saying that there is an awful lot of information available. It's just a matter of going out and digging it out. And we've had terrific co-operation from the various Departments of Government and not only our own but also from the oil industry who have been very free with the information that they have obtained up there. We hope that when the study is completed that we will at least have some basic information on which to start detailed plans and specifications for terminals almost any place in the Arctic. One of the things that is sort of interesting to me and I suppose a lot of you who probably knew this before was the floating fresh water ice islands which apparently come around from Ellesmere Island. There's one right now in Darnley Bay. As a matter of fact we have some people going up there in another couple of weeks to make some surveys

on it. Somebody suggested that the one that came in Tuktoyaktuk last year had to push a channel 5 miles long through 50 feet of overburden which sounds a little fantastic to me, but in order to get there, this is obviously what it had to do. There isn't an awful lot of information as far as I know about this activity. Maybe Commodore Robertson has some comments on that?

PANELIST: Cmdre O.C.S. Robertson

We know quite a bit about ice islands. They originate on off-shore ice shelves. They are nothing more really than tabular icebergs, as you may find in Antarctica. There are a number of them drifting around. They don't move that fast, 3 to 4 miles a day. Some of them have been carefully tracked. There are not a great number of them. I'm afraid that when they come along there's nothing you can do about it. You get out of the way. They will block the entrance of the terminal if they happen to hit there. There's not much you can do about it. They do plow up the bottom in a similar manner to a grounded or semi-grounded iceberg. We know what these will do. We have the scars of operation Pole Vault. When the cable from Cape Dyer was being laid, they said it was to be laid on the bottom and we said "what about the icebergs"? they said "we'll trench". And we were sent away with "advice no longer required". And so they trenched four feet. The first berg that came down took the cable out. Now there's not much you can do about this but we can at least plot the tracks of these things and

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determine long before they reach us if they will be a menace or not

DELEGATE - Mr. J. Rose, MOT Marine Manager, Hay River.

You probably noticed the other day when C.G.S. Louis St. Laurent arrived off the Port of Churchill, that was as far as she was going to go, off the Port of Churchill. There was three miles to make port but she couldn't get much closer. It does bear up the observation that the problem is not to get through ice, it is get to the port the last three miles. I was a bit disturbed when Mr. Benum said that our investigations on ice in the Ministry of Transport seemed restricted to the open sea or the open ocean or the open water. I was wondering why the ice observation is not continued after the navigation season is closed.

PANELIST: Mr. F.W. Benum

I don't think I can answer that. I have stated what we consider the meteorological service area responsibility. With many problems of this nature we certainly do our darndest to assist but I don't know what agency may be studying this particular problem. Perhaps someone else can provide an answer.

PANELIST: Cmdr. O.C.S. Robertson

With regard to clearing areas adjacent to a port there have been a number of experiments tried in the Baltic in melting

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ice which have been mildly successful. There is the bubble system. The one ingredient that is required is a current of some description in the river or a tidal current which is predominately away from the beach area in which you are going to establish the air lines. There are other methods of manufacturing agitation. If there's sufficient depth, you can bring the warmer water to the surface, thereby dispelling the ice. You're not going to melt the ice but you're going to move it away from the terminal area. That has to be a concentrated effort. But that's a very expensive method. For a particular locality such as Churchill I guess that the ice has to be broken by some means or other. I believe that a certain group have discovered some way of breaking ice with their machinery and to move the ice away from the dockside. But the problem is you have to have a hole in which to put the ice. They were using grappling hooks to take the ice away from the particular location. This is going to be one of the major problems of researching terminal facilities. Building and construction can be done by empirical data and facts that have been accumulated but how are you going to control and how are you going to obtain enough data on your currents in the Arctic when a good portion of the time you have total ice cover. During the summer periods you have fluctuations in current effects.

You must remember too, that when the C.G.S. St. Laurent arrived off Churchill, they had just experienced several days

of north-east gales. Ice moves under the influence of wind. It travels $1/24$ to $1/40$ of the speed of the wind. All this ice had jammed into the entrance. The St. Laurent was drawing, I believe, 29 foot 6 draft and there is 30 foot on the bar going into Churchill. Six inches, that is all she had to spare. Captain Fournier did what every prudent seaman would do. He took the key out of the ignition and went to sleep. And when the wind changed the ice that had piled into the entrance of Churchill harbour would then move off shore and he could have gone in but he wasn't going to go in under those conditions. I don't blame him. And I think that any Arctic operation will have to build into it a certain amount of spare time for when the pressures are on and you are not going to make any headway economically. So lets buck the things we can buck and recognize when nature says you can't do anything about it. This is what Captain Fournier did.

DELEGATE - Mr. W. Berg, Hay River, Chamber of Commerce

This question in relation to harbour facilities in Hay River. Hay River has a good harbour, a natural harbour and the Department has done a lot to keep the harbour open from shifting silt and so on, but it seems that there is a sort of a catch-as-catch-can way of operating. Most of the facilities that are there were designed and built by private enterprise. Now, the suggestion that was given to me, was to request that

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the National Harbours Board be asked to make a survey of the area and make recommendations for development through the Government services available. On talking to some of the gentlemen I find that the National Harbours Board cannot make a survey in the Hay River area of the port facilities. However, we would like to see some government agency take on this responsibility and see that the development is done in the proper manner. The harbour facilities are only just touched on, there is maybe about a quarter of the facilities being utilized. Yet we have almost exhausted all of our facilities and all of the other channels and areas that are available are tied up by government departments or in reserve for the native population of Hay River. It seems that unless some government department or agency takes some action in this area these areas are forever going to be tied up and we seriously require them for development.

Mr. W.J. Manning:-We have an office in Hay River and our representative Mr. Rose is sitting in the audience. This is a question not for the National Harbours Board but for the Department of Transport as the Hay River harbour comes under our Department. We provide facilities when they are required not in case they will be required, and I would like to get the views of Mr. Rose on this matter as I am not very familiar with the new harbour.

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DELEGATE: Mr. W. Berg, Hay River

The suggestion was that there has not been a composite plan for the harbour including the use of the land being made available for development.

Mr. W.J. Manning:-This was a point for the setting up of the new National Port Authority which is going to be formed. I think maybe Dr. Camu would like to mention this, or would you sir?

DELEGATE: Dr. P. Camu, Admin., Marine Admin., MOT, Ottawa

Some of these points will be covered this afternoon.

PANELIST: Mr. J.B. Garvie

I would like to add that this is a very refreshing approach: any community inviting the Department or the National Harbours Board into a port. In Vancouver, where I come from, we are trying to get rid of the organization and I think that maybe they should get together with Hay River and discuss their problems.

DELEGATE: Mr. B.N. Malott, Pres. Transworld Shipping Ltd., Mtl.

I would like to speak on Mr. Garvie's comments about the DOT proposed regulations for Arctic pollution in relation to the strength of ships. I think Mr. Garvie and myself are probably fighting a losing battle against the creaking regulations.

I would like to ask this question, I see a number of gentlemen up in front here who are obviously expert on Arctic navigation and Arctic conditions, I would like to ask this question... were you approached by any official of the DOT in relation to these draft regulations?

PANELIST: Mr. J.B. Garvie

As for myself and our company, no, we were not approached. As a matter of fact, we had to write for the regulations. I understand that they are distributed to the architects who design these vehicles in which we have to suffer and manoeuver them.

DELEGATE: (Unidentified)

Now these regulations set the Arctic off into I think 13 zones. All the ice areas are zoned off into 15 zones. In your experience, do you feel that these zones are correctly designated in order of severity?

PANELIST: Cmdre O.C.S. Robertson

In my submission to the committee, I reduced it to eight zones and to seven classifications as opposed to the twelve. I felt that we were getting into almost micro-regulations for the sake of regulations rather than regulations and standards. I also feel very strongly that you cannot divide the Arctic into

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zones such as we are attempting to do. Because fortunately, or unfortunately, the ice cover changes year by year and I would rather support that you may not enter an area or cross a latitude or longitude to proceed to a Canadian port unless, whatever classification the ship was, unless the ice officer, the ice forecaster, approved it. Because some years you can take a birch bark canoe in and other years you can't. It varies just that much, so rather than set down zones and dates, say that you may not cross these latitudes until such a date, with that class of ship, until the ice control centre has said it is appropriate and proper to do so.

DELEGATE: Dr. P. Camu, MOT

There is insufficient time at present to comment on this but I hope to be able to touch on these points during the general session later this afternoon.

Mr. W.J. Manning:-I wish to thank the panel here and all of you people for a very informative meeting. Thank you very much.

Ed. Note: Dr. Camu was unable to present his answers to the questions raised by delegates in the afternoon because of time constraints. However, the following are the answers which would have been given.

DELEGATE: Dr. P. Camu, MOT

For the benefit of Mr. Berg of Hay River, I would like

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to say that the Minister of Transport last summer outlined what a new port policy could be at public meetings in Montreal and Vancouver. Copies of the notes used at these meetings were made available to the public at large in other ports of the country. The proposal emphasized the decentralisation by forming many local Port Authorities with power to manage the day-to-day operations and maintenance of their ports. At the same time, the Federal Government would retain a certain control through a National Port Authority that would group, eventually, the nine existing National Harbour Ports, the several Harbour Commission ports and the 450 commercial ports and public wharves scattered along the coasts and shores of our rivers. Those interested were given until September 15, 1970, to make known their suggestions and their views. Since then, a task force has been analyzing these replies and a report will be made shortly to the Minister.

In the meantime, a demand for a composite plan of a local harbour or any new capital expenditures should be directed to the Harbours and Property Division of the Ministry of Transport.

To answer Mr. B. N. Malott, who is asking if any official of the Department of Transport approached any of those present about the Arctic Shipping Pollution Regulations, I would like to say that a booklet, containing the Proposed Regulations and numbered 9456-65 MRI, and dated October 26, 1970, has been available to the trade. The Board of Steamship Inspection, in a covering letter dated November 10, 1970, said "would appreciate

receiving any comments you may wish to make on these proposed Regulations not later than December 15, 1970". This date may be extended.

Finally, a minor piece of information about ice in the St. Lawrence Seaway. I realize that climatic conditions are not the same as in the Arctic and sub Arctic, but we have been experimenting with the air-bubbling system for several years now. It is used in the immediate vicinity of lock gates in stagnant waters. As said this afternoon, it does not work too well in swift waters where the effect of bringing the warmer air to the surface is lost or is not there where you want it. Other techniques used are portable heaters, special lubricants, defrosters and, perhaps most successful of all but also expensive, is the technique of increasing the flow, when needed, to clear the ice away from the channel or to prevent the formation of new ice. It involved hydraulic studies that are seldom available in large open stretches of water.

SESSION 5B
TRANSPORTATION: PEOPLE AND THE ENVIRONMENT

CHAIRMAN: Dr. G.C. Butler, Director, Div. of Biology, National Research Council, Ottawa.

PANELISTS: Mr. R.A. Hemstock, Arctic Co-Ordinator, Imperial Oil Ltd., Calgary
Mr. A. Stevenson, Chief, Northern Services Div., Ottawa
Dr. W.A. Fuller, Chairman, U. of Alberta, Edmonton
Mr. J.K. Naysmith, Chief, Water, Forests & Land Div., Ottawa.

CHAIRMAN'S OPENING REMARKS

Dr. G.C. Butler:-We have a special mission in this conference in that this is the only session which is exclusively devoted to problems of man and his environment, as affected by transportation in the North. Yesterday we heard some statements to the effect that problems of the Arctic were almost entirely technological. It will be the purpose of the panelists and myself then, the panelist this morning and myself this afternoon, to say that this is not true and to convince you of that and to convince you that the main problems of the Arctic are biological and human and environmental, and that these are the ones that are most difficult to solve.

We're very fortunate in having on this panel four people with vast experience and dedication to the Arctic and its people and its environment, and I think that you'll find what they have to say interesting, stimulating and provocative.

Mr. Walsh told me that my main function here was to introduce the speakers, so perhaps I had better begin with myself; and right away let me say I have the dubious distinction that I have less experience with the Arctic than anyone else at this conference.

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In fact this is the first time I have been north of Edmonton, but as Director of the National Research Division of Biology, and as vice-chairman of its associated committee on Scientific Criteria for Environmental Quality, I have both professional and personal interest in biology and that includes man and his environment. Because of this I feel most honoured and interested to be allowed to participate in this way in your conference.

The first speaker that is going to talk to us is R.A. Hemstock, Regional Arctic Co-ordinator for Imperial Oil Ltd. He has spent all of his working life studying technical problems of Canada's North and he has been described by some people as an oil developer with a conscience. He's going to give us his views of how modern developments in transportation are affecting now and will affect in the future the environment and the people of the North. Mr. Hemstock.

TRANSPORTATION - PEOPLE AND THE ENVIRONMENT

BY: MR. R. A. HEMSTOCK

SUMMARY

This paper highlights in a general way the impact that each of the modes of northern transportation have had on people and the ecology and offers some projections for the future. While roads are cited as the worst offenders at the present time, this will be exceeded as far as the ecology is concerned by pipelines. However, habitation by man which is facilitated by transportation, is considered to be by far the

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greatest threat to the environment. Significant changes are therefore necessary in the ways of living in the North. The point is made that northern people are presently caught up in the twentieth century and there is no going back. The problem needs to be understood now in order to develop the correct long-term solution which will minimize the effect on the environment.

Dr. G.C. Butler:-I would like to remind you that our method of proceeding this morning will be to have all four speakers give their talk, which I hope will be finished around 10:00 a.m. and then we'll have one half hour for discussion, questions and argument afterwards. Don't forget the very interesting and large question that Mr. Hemstock has given you; should we move people into the Arctic, on a rotation basis? Or should we attempt to populate it more heavily as we develop it? This should make for quite interesting discussion later on. Our next speaker is Alex Stevenson, Chief of the Northern Services Division of the Dep't. of Indian Affairs and Northern Development. He is a veteran in Canada's Arctic having served in the Hudson Bay Company 30 years ago after the war as Administrator of the Eastern Arctic and numerous other jobs in connection with Canada's North. In addition to the professional qualifications, he is an amateur historian, a sociologist, he has studied the history and problems of Canada's North and its people and has published many articles on the subject. He is going to talk to us this morning about the

human resources that must not be overlooked in economic development of Canada's North. Mr. Stevenson.

THE ECONOMIC AND SOCIAL IMPACT OF NORTHERN TRANSPORTATION
BY: MR. A. STEVENSON

SUMMARY

The first half of this paper highlights changes in the way of life in the North which grew out of the transition from using traditional forms of transportation such as kayak, snowshoes and dog teams through to the more recent use of stern wheelers, barges, roads, unscheduled and then more recently scheduled aircraft flights. It leaves the thought that changes in transportation have imposed social changes on northern people for which they were not prepared. Southerners then go on to unfairly judge them by the standards prevalent in southern regions without a sufficient appreciation of the demands on individuals making the transition from another social order.

The second half of the paper focuses on the participation of northern residents in the economic benefits of transportation through employment. The view is expressed that we have not provided northerners with a sufficient opportunity to be a part of the changes in transportation through employment on construction and operation of the facilities. This is closely associated by the author with the need to improve the educational standards prevalent among Indian and Eskimo people and he provides indications

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that improvement is coming about. The paper then goes on to say that academic and vocational training must result in the stimulation of opportunities for employment and that this requires backing by employers through policy decisions and on-site action by local managers.

The final note is that in our pursuit of natural resources in the North we should not overlook the affect this will have on communities and individuals and that there should be a greater involvement of northern residents in the decision-making processes which are likely to affect them. The paper pertains largely to social aspects and only cursorily with economic considerations.

Dr. G.C. Butler:-Our third speaker is Professor W.A. Fuller, Chairman of the Dep't of Zoology at the University of Alberta in Edmonton. He lived at Fort Smith for nine years some time ago, and three of his children were born there. He still carries out biological research in the Arctic and speaks of the Arctic with warmth and with sentiment. If you have read his paper you'll know that he describes himself as I quote "A lover of the North who resents the many scars and abuses inflicted on it in the name of progress." He is going to talk to us about the effects of transportation on the environment and the ecology of the North.

Dr. Fuller.

TRANSPORTATION AND ECOLOGY

BY: Dr. W. A. FULLER

SUMMARY

The author considers himself "primarily a lover of the North who resents the many scars and abuses inflicted in the name of progress". He describes the ecological constraints of the North: scarcity of nutrients, limited energy input because of the short summer, few species of fauna and flora with the net result that productivity is low and recuperative powers of the systems are also low. Permafrost and seasonal phenomena are reviewed.

The effects on the ecology of the various transportation systems are briefly described. He stresses the need for a close watch on developments which may have widespread ecological effects, cites the Bennet Dam and reviews some of the major hazards. He recommends: the use of corridors to minimize ecological and esthetic "insults," the immediate identification of critical areas, full and free discussion of plans, and long term planning rather than short term expediency.

Dr. G.C. Butler:-The fourth and final speaker of our panel is Mr. John Naysmith, Chief of the Water Forest and the Lands Division of the Department of Indians Affairs and Northern Development. You have him to thank for talking me into taking this job as chairman. So if you don't approve of the way I am doing things, speak to him. From working with him over the past

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year, I know that he is dedicated to the proposition that we must not forget the place of man in the development of our resources, and he continually espouses his point of view in Canada and in other Countries. He is going to talk to us about his major present occupation :How can legislation be designed to protect man and his environment? Mr. Naysmith.

TRANSPORTATION - PEOPLE AND THE ENVIRONMENT A LEGISLATIVE BASE
BY: MR. J.K. NAYSMITH

SUMMARY

The first part of this paper describes a concept for developing legislation to conserve the environment. The value of the environment is seen to be summarized in three needs of mankind; material, recreational and perceptive. Identification of four elements of a legislative conservation program is then made: preservation, protection, managed-use and restoration. In order to reconcile man's needs with the legislative program, guidelines are set out for each of these elements. The point is made that none of man's needs can be met by legislation covering a single element and therefore, a multi-element approach is required. Examples are given to show this process of mixing and balancing the elements of legislation to serve a particular need.

The second part of the paper deals with the type of regulatory control that is possible since passage of an

amendment to the Territorial Lands Act on 26 June, 1970. Pertinent sections of the Act which provide for the identification of "land management zones" are reproduced and the subjects covered by the proposed regulations are stated. The paper explains the method for arriving at land management zones and gives an illustration of the stipulations contained in a typical land-use permit.

Dr. G.C. Butler:-This completes the presentation by the four panelists, and I now invite them to come to the platform, and we will be glad to have questions and comments by anyone in the audience. Mr. Naysmith finished by saying that only by listening to the people of the North could we come to understand them. Perhaps there are some here who would like to say something to us, if we can persuade them to do so. We will continue this discussion as long as it is lively or until coffee break, whichever comes sooner.

SESSION DISCUSSION

DELEGATE - Mr. J.F. Tooley

I'm associated with the Nordair Company. We have a transportation system that runs from Montreal up to the Eastern Arctic, and further on to Resolute Bay. During the past two years, the airlines serving the North country have substantially increased the capability and sophistication of their equipment serving the North country. What exists there is certainly not

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the ideal transportation system and that is why we are here. But I wonder if one of the panelists could comment to what extent the increased sophisticated equipment, mainly the 737 airplanes capable of landing on gravel runways, have been of benefit to the residents of the North country?

PANELIST - (not identified)

I don't know if I'm the expert. But! I do think improved transportation or communication is definitely a benefit to the people of the North. I think the answer is yes.

Dr. G.C. Butler:-Perhaps there is some one in the audience that can answer this in a realistic way?

DELEGATE - Mr. Ray Charleton

I'm not going to attempt to answer it, but I might be able to add something to it. I'm Ray Charleton, I'm the Purchasing and Supply Officer with the Territorial government. In this position, I'm part of a service organization that supports the four major programmes of the government, mainly local government, education, social development and industry and development. All of these are people programmes, and in order to make our money go as far as we can to provide housing, educational facilities and other aspects that better the life of the individual in the North, we are always looking towards a better service for trans-

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portation. We're very cognizant of the fact that we can not do this as economically as possible if there isn't a connection between people movement and movement of cargo. We seem to be placing a great deal of emphasis in this particular session on people whereas the others have been concerned with moving great quantities of cargo. I'm quite apprehensive that we might get lost in the shuffle with the minimal amount of cargo going in as regards to the rest of the cargo we are talking about. In actual fact we have seen a great change in the last four years, in the amount of cargo we can move by air, and the number of people travelling by air. I think it isn't a question of the north-south transportation routes that we are really concerned with, but the development of smaller transportation patterns developing from our major centres. One of the panelists mentioned this morning that in the South, we have to come into communes or larger communities. This is happening in the North as well and it isn't all the government that has done this. It is a tendency by the people themselves. This is evident in Frobisher where a great percentage of the Eskimo population congregate. Now these people move into the major centres and they must have the means of getting back and forth to the smaller communities. We can go right across the Arctic and talk about Inuvik, Cambridge Bay, Resolute and also Frobisher. And this is happening where these people want to come into these centres and they want to go back to their homes. Sure we need the main feeder lines and the

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sophisticated equipment to get from North to South but we also have a very great need to develop transportation to meet people's needs, and the only way I can see in the foreseeable future is by air and bearing in mind that the air would probably be the least one of the contributing factors towards damage to the ecology. Thank you.

DELEGATE - Dr. E.F. Roots

I'm Fred Roots of Energy Mines and Resources. I don't think I can answer Mr. Tooley's question either but there is one comment that I think many of us can observe. That is the effect of the increasing sophistication of North-South transportation. This is that it does tend to reduce the differences in values between the North and South, it makes the people living in the North of whatever background a little more dependant on cash economy and material things which they are accustomed to in the South. The lack of these in the North becomes more evident and makes it slightly change the value of these perceptive values John Naysmith was talking about, which alter the character of living in the North. So these perceptive values that to some degree are a change, which give a different baseline for values in the North, are being altered by the increasing efficiency and sophistication of North-South transportation. It tends to eliminate the quality differences, it doesn't necessarily make it better or less, but it changes their values and eliminates

the differences in material life to North and South, and this makes the perceptive values a little harder to quantify.

Dr. G.C. Butler:-Next man.

DELEGATE - Dr. Paul Deprez (Department of Economics U. Manitoba)

I would like to add something to what Dr. Fuller said, and perhaps bring back this discussion to the heart of the economics of our transportation problem. He was mentioning Pine Point, being amazed that our biggest mining operation hasn't changed anything to the situation of the South shore of Great Slave Lake, and I hate to mention what amount the Federal Government has put in. Constructing the roads, the railway, the airstrip, but for various reasons we have constructed both a road and a railroad there in exploitation of natural resources. We left out, for what reasons I don't know, Fort Resolution, and this is one of the main reasons that the poverty situation still stands. Because if I recall well only 15% of the total labour force in the Pine Point Mine (Cominco) originates or is recruited in the Northwest Territories, the rest are brought from the outside. This has been a problem that we have been avoiding since yesterday. We have been talking about transportation in the exploitation of natural resources then we try to reestablish a policy in terms of avoiding ecological damage. But for one other reason I have difficulty to grasp we have left out the

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question of the development of human resources. This has always been absent from our discussions. I think this is something I wanted to state.

Dr. G.C. Butler:-I would just like to reply to this. I hope that you didn't think that we were leaving out the human resources in the presentation of the panelists this morning. It was exactly this gap that I said this session was trying to fill, and I think that our panelists have made these points, all of them.

DELEGATE - Mr. M. Archer

I'm Maurice Archer of Canadian National Railways. I don't have all the figures but we do employ some native people to run our trains to work our trains and to do maintenance. Now I don't have the number but we are training some, and we also have some in telecommunications, and I agree with you, we have to use as much as possible of the native population.

Dr. G.C. Butler:-Thank you. I wonder if Mr. Adams would like to comment on any of the discussion that is going on here. I might add that Mr. Adams is from the west coast of Hudson Bay, and it looks very much as if he is going to be a member of the Northwest Territories Council. I think he is going to get in by acclamation. We will see what Mr. Adams has to say.

DELEGATE - Mr. W. Adams

My name is Willie Adams. I used to be an electrician

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at one time but now I have had to resign from my government job to get into the Territorial Council. I like my trade but I say use the local people in the Northwest Territories. I have been in the North now for quite a while and I have seen lots of Eskimos who had a trade. Many different trades, especially heavy equipment and plumbing and electrical. I've been travelling with a transportation company. I have travelled in the air, on the water and the land and a few times I've walked home. We have a few problems in transportation living at Rankin Inlet. I would say a lot of people have been travelling between Whale-Cove and Chesterfield. At Whale Cove if I buy gas for my skidoo it costs me about \$11.00. If my skidoo breaks down, it's going to cost more, maybe lost time, everything I've been working for. But if I go by air from Whale Cove to Rankin it only costs \$12.00. It's the same price about \$11.00 by air to Chesterfield. By skidoo, it is going to cost me more. I have to go all around the bay because sometimes we have no way, sometimes no way by road, to get into Chesterfield. It is going to cost, I would say gas \$24.00 to go to Chesterfield and return. Pretty near the same amount all right and maybe at the same time I have trouble with my machine.

I just heard there was pollution a little while ago in the water. I'd like to say we have been drinking water in the lakes and I've seen planes being gased up in the lakes where we have been drinking and I've seen lots of gas spilled

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over. I hope something is to be done before it's too late.

Thank you.

Dr. G.C. Butler:-Thank you. I can see Chief John at the back there. Would he like to say something about the effects of transportation to the people in the North?

DELEGATE - Chief John Tetlichí

It's a pleasure for me to come here and speak and say a few words about the Arctic transportation. Transportation is a very important thing down north of 60, plus you get service. Fort MacPherson is sitting about 100 miles south-west of Inuvik and when you come to see the place it's a little bit deserted, a little bit off one side, and then the way things go you know people in MacPherson are not too happy with the transportation deal. I was glad I came up here to present this to most of you people that come from south and most of you from north of 60.

You take right now, they're going to build a nursing station and this has been cancelled for the last three or four years; next year, next year, next year. Finally we got it this year and then they're building an R.C.M.P. subdivision sort of a little apartment for them, you know, in Fort MacPherson. When this freight was coming right into MacPherson they got down to north of Peel, ice was coming, they turn around and unload the whole thing right in Arctic Red River and that's about forty

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within fifty miles east side of Fort MacPherson and then they had to spend that much more money to get the stuff in to complete the building. The R.C.M.P. building is finished, completed, turned over to them and they got enough and the nursing station is still going.

I tell you my friends I'd like to see that Dempster highway come through real fast. That freight can be any cheaper than the Northern N.T.C.L. (Laughter from the audience). It may sound like a joke, but it's not. Supposing if our grocery freight didn't come in and it had to be landed that far away and have to have it flown in and lack of employment, the people really going to suffer you know. Right now I'm going to tell you one thing, you pay what you pay for a dozen eggs right south of 60. We pay \$1.45 a dozen eggs. Boy, I tell you, you got to think a little bit before you buy that one dozen eggs I tell you. So with and from MacPherson, about the Northern Transportation this is no satisfaction to us from Northern Transportation and they left the stuff right in Arctic Red River, and I think the contractors they are not too happy about it.

Dr. G.C. Butler:-Mr. A. Okpik would like to say a few words.

DELEGATE: Mr. A. Okpik

Thank you very much Mr. Chairman. Mr. Minister I'm Abe Okpik and I travelled in most of northern Canada the last year

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and a half, and I've hit every small Arctic settlement in the Northwest Territories. Yesterday morning you saw the routes I had to take in order to get in and out of these settlements. It is difficult to understand when you are sitting in Grise Fiord to think about going to Inuvik and finding your route by the south. At the same time you know you have to travel almost 6,000 miles and back out again. Now this is our land here and I think that if we had more with the technology and everything that we are talking about we can compromise on travelling across the Northwest Territories. Somebody who has an idea about inventing machines or new aircraft or air cushion machines or whatever it is, it is just the type of thing that should be instituted as quickly as possible because when we think about our education in the North among the Eskimo population and Indian we have made a big advancement in 20 years like Mr. Stevenson indicated.

What we are educating people for is the question in a lot of those young people's minds. What are we doing with them? They have their education, go up North and some of them have their degrees, tradesmen and so forth and they come back and there's no work. This is the problem. Now what I try to focus in my mind is that I think when we educate these people through our education system we should encourage them by all means to try some other fields in other areas. Maybe they can go and be a roughneck in Arabia or maybe they can go to South America to be a lumber man or a carpenter. I think that when we think about these people

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say that you go up North this is where you live this is where you are. I think it is the wrong attitude. Our encouragement should be to focus these young people to some other areas where they can be useful to the place they want to be. Not telling them: You're educated, you go back up North because I'll tell you the North has changed a great deal as I mentioned. The last speaker spoke about environment and the people and I think that if we want the people to survive on the land like we talked about we should have a better system to provide them with the necessary equipment. Now thinking back 40 years ago, 35 years ago people used to live off the land. The economy some years is very good depending on the increase of population of the animals or the prices for the fur. The fur is still here and the people are there. Now when we talk about education this is the type of thing that we should think about and try to reeducate children in some ways if we want them to stay on the land, to use modern equipment or to make their transportation available to them or the land that they want to live in. For instance I was in Prince of Wales Island on several occasions when I was at Spence Bay and that land or that island is almost identical to Banks Island where I have lived also and there are a lot of foxes there some years that nobody touches at all. And when I am talking about foxes I mean a lot of foxes where you can make a good living if you have got transportation or technology along with it and I

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think that if we want to educate some of those people we should be able to move some of them where they will advance a great deal on trapping. Move them east and take some from the east, good seal hunters and bring them west. This sort of thing is something that I would like to see. However I'm not the one that makes the decision. I just wanted to touch on some of these problems that I see in the North when on my travels. I appreciate your listening. Thank you very much.

Dr. G.C. Butler:-I believe Mr. Trimble is in the audience and can speak for a number of northern people. Would you like to say something at this time.

DELEGATE: Mr. L. Trimble

Thank you very much. My name is Lyle Trimble. I'm a businessman and commercial pilot in Aklavik and have been the elected member on the Northwest Territories Council for the Delta area for the past six years. As far as transportation is concerned I remember a couple of years ago when three of us on the Council went to Resolute Bay on a committee meeting to meet with the people concerning the future of musk ox. It was necessary after our committee meeting was ended for me to get back to the Delta as soon as possible and we went by charter. The other two members were remaining on some other business and in order to get back as soon as possible it was necessary for me to go from

Resolute Bay to Frobisher Bay on the Atlantic Ocean, Montreal then Toronto, Calgary, Edmonton and back up to the Delta. This is the situation as far as transportation is in the North and still exists today and I think that as far as air transportation is concerned that a great deal of emphasis has to be given to providing lateral routes and routes as has been mentioned earlier this morning to provide a meaningful transportation link between all the various communities for the benefit of the people in these communities.

As far as the people generally are concerned I'm firmly convinced, and I have been in the North almost 15 years now, that the native peoples of the North have been going through a transition period and going through quite rapidly. When I first came North there were very few native people that held permanent jobs, that were interested in holding permanent jobs or socially and otherwise capable of holding permanent jobs. Today there are a great many people that do and there are a great many people that would have the desire to do so if it was possible, if they had the technical and other training that would qualify them for employment and if they had the same employment opportunities that many people from the south have. I firmly believe that the native people are becoming capable of taking over many of the employment opportunities in the North today. Education has advanced very rapidly and I feel that education in the North among the native people is just as good as it is in the South. I think the social

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changes have been quite remarkable and the native people have become more accustomed to the white man's type of society, his economic and industrial way. I'm no longer looking, this is the majority, I'm no longer looking to the trap lines to provide them a living from day to day and season to season. They have to be given the opportunity and this requires training which is the dual responsibility I believe of government and industry, and I would hope that the peoples of the North whether they be Indian, Eskimo or Metis or whatever are considered as a first priority in the development of the North as far as people are concerned. There was a comment when I first came in this morning as to which would be best: to bring people into the North on a permanent basis and try to encourage them to become permanent residents or to bring people into the North on a rotating basis. And I suggest Mr. Chairman and members of the Conference here that the first priority should be to endeavour to train and give the people in the North the opportunity to take over these responsibilities and the problems that you are faced with as far as moving employees from the south and north and back and forth and the high cost involved would be eliminated.

Dr. G.C. Butler:-We are getting near the end of our time now. Does anybody? Yes a man there would like to speak. Would you come to the microphone please.

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DELEGATE - Mr. A. Okpik

May I have the microphone please, he wants interpretation.

DELEGATE - Mr. Tikivik of Frobisher Bay

I am happy to be here to attend your conference and for the arrangements that have been made for me to come here. I can speak English fairly well, but since I want the people to understand and I can think better in my own language I will have the interpreter repeat my words of what I have to say in Eskimo.

Since we are talking about transportation in this conference, transportation in Baffin is one of the real problems in that area. The anxiety that the people have is when they have been called into the hospital from isolated communities into Frobisher Bay or south and upon their return sometimes they have to wait weeks to get in and out or to get back to where they are and this is involving a transportation not sufficient enough in the area. Since I mentioned transportation we know that it is a problem and I would also like to speak a bit on the food prices we have to pay in the North in Baffin Island and I would like to give you a few details, as all of us know we have to eat to live.

Food prices is a problem in each community over there because of high cost of prices, but we yesterday morning heard a gentleman speak about egg prices of \$1.25. I would like to give you an example of how we are treated in the North. Sometimes we don't know what price we're going to pay from day to day because

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prices go up and down and nobody has control over that I've seen them \$1.25 one day and maybe next week \$1.39 for a dozen of eggs only.

We are also concerned about ice breakers coming in and out of there and testing ice up north of Baffin. I can't see with this type of advancement why can't they use that kind of shipping between Frobisher Bay and Montreal, coming up the Bay and bringing the food on an all year basis rather than having to wait every year for shipping. I would like to speak a bit more on this ice condition in Frobisher Bay. The ships can be brought in there and don't have to use landing barges any more because after thaw this summer, for the first time, a huge helicopter packed these from the ship to land. There was no problem because even though the ship might be down the Bay a few miles, it can work back and forth with no problem.

When I was called to this conference I had to leave Frobisher Bay by Montreal, Edmonton and Yellowknife. Now, it seems a long way around travelling that way for the first time. Wouldn't it be better communication if air carriers could go from Edmonton to Churchill to Frobisher Bay. This is the type of thing I'd like to see to get here and there at a faster rate.

I would also like to talk a bit about our problems in communication. We have a member of Parliament or a member of Northern Territorial Council. Would it be possible for a man who is an elected member to make sure that he's talking to the

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people through an Eskimo person who will be communicating with the Eskimo population and giving information back and forth so that we can understand a bit more about what is happening in this area. And finally I'd like to say, talking about this communication between, for instance, this conference and other conferences that if we can get many native people into a conference then perhaps we can communicate better in every area. I don't want to say that everything you say is bad and everything I say is bad, but there has to be a full understanding between the people, the people themselves and the North.

It's good for us to be here at this conference and more and more should be practised in this line because the North is big and we'd like to express our views on some things and we'd like to hear your opinions on some things and I think that this is the way we should communicate and know each other better. I have also lived in an igloo and it's not very easy to live in an igloo and now I'm happy because it's better and in those days when we used to travel by dog team or other transportation we never had to pay for it because it was always hard work and it meant hard travelling.

I have talked for quite a while now, but I would like to explain something. When I was small somebody gave me an apple and I didn't like it because it didn't taste like anything, but now that I like the apple it cost too much to buy it.

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Dr. G. C. Butler:-Thank you for that interesting discussion.

The session is terminated.

SESSION 6A
TRANSPORTATION FACILITY COSTS AND USER CHARGES

CHAIRMAN: Prof. J. Welsby, Faculty of Commerce, University of
British Columbia, Vancouver

PANELISTS: Mr. I.C. Cornblat, Assist. Deputy Minister (Fin.), MOT,
Mr. K. Wyman, Research Branch, C.T.C., Ottawa
Mr. E.T. Haefele, Resources for the Future Inc.,
Washington, D.C.
Mr. P.J. Detmold, Research Division, C.P.R., Montreal.

CHAIRMAN'S OPENING REMARKS

Prof. J. Welsby:-I would like to welcome you to this session of the Arctic Transportation Conference in which we are going to talk about transportation and user costs. Having sat through a selected group of the sessions so far, I have been interested to hear many proposals that have been put forward relating to all sorts of investments that are urgently required in the field of Arctic Transportation, ranging from navigational aids for shipping and air services, meteorology, roads, etc. At this point in time I think we have to start asking some questions as to how in fact the types of investments that have been proposed are to be financed and paid for. One might almost call this session "The Hour of Reckoning". The panel members who are going to speak this morning I will introduce at this stage. Each member is going to give a very short precis of the points that he makes in his paper, we will assume that the papers have in fact been read, this will enable a considerable amount of time to remain for questions which you may have for the panel and I would imagine that much of what is said

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here today may well in fact be considered controversial. You will have to forgive me on occasion, I might slip back into my English terminology. At this stage, I introduce to you Mr. Cornblat.

TRANSPORTATION FACILITY COSTS AND USER CHARGES
BY: MR. I. C. CORNBLAT

SUMMARY

The paper is a factual outline of federal expenditures on transportation facilities in the north with a comparative analysis of revenue covering the period 1965 to 1970.

In this period expenditures, both capital and operating and maintenance have amounted to \$198.8 million while revenue fell short of \$39.0 million. While revenues have increased by approximately 8% per year during the past two years, this is considerably less than the 15% per year increase in expenditures. If the present trend is any indication of what is to happen in the future this gap will likely increase in proportion.

Prof. J. Welsby:-Thank you Mr. Cornblat for a very illuminating presentation outlining where we stand in the Arctic in relation to the general principles that are defined in the Ministry of Transport with respect to user cost recovery. An interesting question that Mr. Cornblat raised, at one point in his presentation, was whether or not the general principles that appear to apply

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to transportation in general in Canada, should in fact be modified to take account of the particular circumstances of the Arctic. Our next panelist, Mr. Wyman will now offer some thoughts on exactly this question. Mr. Wyman.

TRANSPORTATION FACILITY COSTS AND USER CHARGES
BY: MR. K. WYMAN

SUMMARY

The paper is an economic treatise which attempts to reconcile two schools of thought with respect to user charges. One is the free enterprise ideal while the other is based on the concept of bureaucracy as a means of making resource allocation decisions.

The author briefly outlines the past history of federal involvement in the North when the free enterprise ideal was closely followed to the present when federal investments in transport have tended to depart from this ideal in favour of cost recovery through user charges. However, this principle is also being questioned as a practical guide to policy making.

Some of the assumptions being put forward to justify the case against user charges and in favour of subsidies are the public interest and the rate of economic development, the indirect benefits which otherwise are not adequately reflected by the prices arrived at in the market and finally as a means of income redistribution.

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The major emphasis of the paper is not on the individual merits of each alternative but on the need to view each assumption with caution, both from a national standpoint and from a standpoint of users of facilities. To the extent that the federal government does depart from the user charge principle, it must be ready to assign priorities in order to avoid a conflict of objectives.

In conclusion, the paper cautions against a too rigorous approach to the various assumptions put forward to justify departures from the user charge principle. Both the free enterprise ideal and the bureaucracy are open to question in such a case.

Prof. J. Welsby:-Thank you Mr. Wyman. I can imagine that some of the members of the audience may have one or two questions that they would like to ask you later on. At this stage I would like to call on Mr. Haefele who in his paper draws some rather interesting inferences on the direction that alternative policies, in relation to user charges, may lead us in areas which at first sight we may not even think have got a direct relation to this question. Mr. Haefele.

THE FEASIBILITY OF FACILITY USER CHARGES IN
NORTHERN TRANSPORT, BY: MR. E.T. HAEFELE

SUMMARY

The paper begins by posing the question of whether or

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not northern transport can pay its own way and whether or not this is desirable.

The author contends that northern transport investments must be applied to a broader framework of national policy and goals in education, social welfare and economic development. Factors detrimental to a user charge policy in the North are a 10 to 1 ratio of north to south freight movements and its inability to be able to take advantage of any agglomerative economies.

Mr. Haefele goes on to stress the need for government to encourage the concentration of population in fewer and larger settlements if the user charge principle is to apply. He does not foresee any possibility of self support beyond four or five major centers in the North.

In conclusion the paper reaffirms the need for consideration of the whole matter of user charges in the North within the broad area of national goals and priorities. If transport is to be used as a means to accomplish non transport ends, then it must be measured not by its financial self sufficiency but whether the cost is worth the end accomplished.

Prof. J. Welsby:-Thank you Mr. Haefele for focusing our attention to this question of a wider framework within which we might in fact decide to investigate transportation problems. The next contributor, Mr. Detmold, I would like to say has stood

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in on very short notice on this panel. It gives me pleasure therefore to now call upon Mr. Detmold to present his thoughts on this problem of user charges.

SOME THOUGHTS ON USER CHARGE POLICY FOR NORTHERN TRANSPORTATION
BY: MR. P.J. DETMOLD

SUMMARY

In a developed region transportation facility charges should reflect the cost of their provision. But in the North, community development is a national goal which makes it difficult to apply the user charge principle in the usual way. The system must be developed with some government assistance so that an efficient user charge policy (based on the market function) can be devised while national development goals are also being attained.

The author sees two alternative courses of action:

- (a) Procure services considered necessary
- (b) Inject government capital in the most favourable projects and the transport requirements will develop therefrom.

Course (a) is "one problem with numerous interdependencies of the multivariable factors involved and defies solution by other than one powerful interdisciplinary team working together in one place". This "omniscient authority" may not be available.

Course (b) would not provide a neat and tidy solution but it might provide a much less disastrous solution than course (a).

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Course (b) should consider the various requirements of a facility cost and user charge system:

- (1) Definition of safety and other standards
- (2) The Operator should share financial risks
- (3) Action to achieve financial self-sufficiency as soon as possible
- (4) Minimal interference with incremental revenue (author is against subsidy per unit hauled)
- (5) No inequality of subsidy between modes.

The author discusses how to achieve such a system and indicates a preference for initial capital grants and outlines two different approaches. The essential point is that user charge policies should:

- (a) not bias the choice either between modes or routes;
- (b) have minimal interference with basic economics of supply and demand and the channelling of investment funds.

Prof. J. Welsby:-Thank you Mr. Detmold. This completes the presentation of the panel and at this stage we are now open for questions from the floor. Yes, a gentleman down here.

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SESSION DISCUSSION

DELEGATE: Mr. B.N. Malott, Trans-World Shipping, Montreal

I would like to know Mr. Chairman how far the Government would propose to go in these user charges. For example, each commercial ship going North in order to obtain insurance coverage and perhaps reduce rates must have an ice breaker in attendance. Now would the Government plan to charge the commercial operator a portion of the costs of operating this ice-breaker. What portion of the ice breaker charges would be relegated say to sovereignty, what is the picture?

Prof. J. Welsby:-Again, I think this falls to Mr. Cornblat he was the unfortunate individual who had to stand up here and represent Government policy in relation to recoverable user charges, and I think your question is very appropriate for Mr. Cornblat.

PANELIST: Mr. I. C. Cornblat

I would like to pass this ball right on to my colleague here Dr. Camu who might say something about this but the concept of user charges or supportable financing whatever you want to call it, is not something new. In the concept of the Ministry of Transport, user charge recovery of cost is a dominant factor, but what I failed to mention were the qualifying words "to the

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maximum practical extent" and we are a far piece away from even reaching that definition, the "maximum practical extent". We are just beginning to examine our existing sources of revenue. We are trying to relate these to new considerations and new factors and whether or not we will be charging for the kinds of services you just mentioned, I wouldn't know at the moment. I am sure we will somehow if we can, if it is practical, if it makes sense, but at the moment I just can't say yes or no.

DELEGATE: Mr. Ray Charleton, Territorial Government

I'm Ray Charleton and I'm with the Territorial Government. That makes me a public servant of a different kind. I'm about to elaborate on this a little bit. We are not of a provincial nature so all our revenue through natural resources goes to the Federal Government, in turn for which we put our programs up and we are voted money back to carry them out. Now it seems to me that in approaching northern transportation and user costs that if the Ministry of Transport were to carry this to its conclusion and charge it all back it would be like taking it out of one pocket and putting it in another. In other words, they would have to give us from the Federal Government enough money to get on with our show here, to cover the increase in costs. I would like to mention that we do not as a Territorial Government have the money to pay the user charges under our present program. Then it raises another question if

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we are not going to pay user charges then how can you levy them against people who are developing in the area? We are paying the cost of the Pine Point Railroad development, that is the CN Railroad, I think it has been eliminated or is about to be, but there was a \$350.00 surcharge per box car going north from Roma Junction to Hay River, so I don't know whether they are taking this off us to cover the cost of O & M or whether it is to start to amortize their big expenditure in the capital outlay for building the line. But it does pose a lot of problems and I feel that if this was passed on to the carriers, Mr. Malott mentioned this, how far are we going to go? How much does the Federal Government have to do. Now, I think some of the aircraft would be trying to land on cow pastures outside if the Federal Government hadn't jumped in and put some airport facilities in there and I say the same thing in the North, that if we don't get airport facilities the means of this particular conference is going to be lost. It has it's place and I don't think the Federal Government is going to be able to duck out of it as easily as they think in the next few years. Thank you.

Prof. J. Welsby:-I don't know if any member of the panel wishes to respond to that. Peter would you like to say a few words, being a rail man, about the particular Pine Point Development.

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PANELIST: Mr. P.J. Detmold

Well, my view here is purely a personal one, but I feel that the essential in all this is that there should be no inequality of advantage of one mode to another. Indeed, one does not need to get as far as the second page of the National Transportation Act to find something very similar to this in print. I feel that if one mode has a greater degree of assistance, say in the provision of airports or roads than another, then the development will become inefficient in the sense of use of resources because the most advantageous of the treated modes will get more traffic than it deserves on a purely economic basis. The second point I think is a more subtle one, I think it is really very vital, and that is whatever the capital investment in a mode, what that mode carries should be determined by whether the extra revenue by carrying the particular freight, or particular passenger, meets the cost of his carriage, excluding paying back the capital resource. This is old economic theory, it belongs to the last century, but I do believe that it still applies. I believe that if, on the one hand you put a continuous pro rata charge on a particular transport service, then goods which ought to go, which should be transported, won't move. Industries won't develop in the North that could be developed economically. If on the other hand you put on a big pro rata subsidy then you get all sorts of unsound development and ultimately the bill will go up, and up, and up until the balloon

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bursts and you get industries breaking down and people thrown out of work and all this kind of difficulty. So, I think one has to keep to these two essential yardsticks in planning a northern user charge policy.

Prof. J. Welsby:-Thank you Peter. Are there any further questions please?

DELEGATE: Mr. J.F. Tooley, Chairman, Nordair Ltd., Dorval

I don't have a question Mr. Chairman but I would like to make one or two comments. Allow me to identify myself first. Tooley from the Nordair Company. I think it is premature to talk about user charges at least from the standpoint of air transportation. The facilities in the north country are not the same as they are in the south and things like landing fees are roughly the same as they are down there, at least at the major airports. At the more primitive airports there are no terminal facilities, the responsibility for their operation has not been assumed by DOT, they are still in the very primitive development stages. I think it is interesting to observe that there is no user on the panel.

Prof. J. Welsby:-If I might just correct you, I think we are all users.

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DELEGATE: Mr. J.F. Tooley

In that case, Mr. Chairman, it is or may become a question of from whom the charges should be collected. If you are the end user or we are all the end users, perhaps they should be added on to the tickets as a user charge instead of being borne by the aircraft companies or the airlines as historically has been the case. I think that is all I have to say.

Prof. J. Welsby:-Thank you. Perhaps, in response to what you have said, I would just like to say historically I would have thought that the airlines do exactly what you are suggesting in that I think that no one here pretends that the airlines can go on forever accommodating user charges, of facilities charges, or increasing costs without passing them on to the consumer. I think essentially what you are suggesting is in fact followed at the present time.

PANELIST: Mr. K. Wyman

Mr. Chairman I am not only a user I am also a tax payer and I would like to mention that historically one of the main groups that has been paying for the costs has been the tax payer. So it is just not true to suggest that it has been bearing the costs that have been occurred over and above what the users have been paying directly for the facilities provided.

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Prof. J. Welsby:-Thank you. It is approaching the lunch hour. I would just like to thank you all for your attendance here and I would like to thank the panel for the time they have spent in preparing their presentations. Gentlemen, thank you.

SESSION 6B
NORTHERN RAILROADS AND SOLIDS PIPELINES

CHAIRMAN: Mr. M. Archer, Vice President, Research C.N.R., Montreal

PANELISTS: Mr. W.W. Collins, Senior Railway Economist, Ottawa.
Mr. M.P. Taylor, Manager, Northern Operations, White
Pass & Yukon Route, Vancouver.
Mr. V. Cox, Area Manager, C.N.R., Saskatoon.
Mr. A.F. Joplin, Dir., Planning, Cdn. Pacific Railway,
Montreal.

CHAIRMAN'S OPENING REMARKS

Mr. M. Archer:-Good morning gentlemen. I would like to welcome you to Session 6B which will deal with pipelines and railways in the North.

Our first speaker here today is William Collins, Senior Railway Economist, Canadian Surface Transportation Administration, Ministry of Transport. Mr. Collins.

RAILROAD AND SOLIDS PIPELINE TRANSPORTATION IN THE CANADIAN NORTH
BY: MR. W.W. COLLINS

SUMMARY

Railways and solids pipelines share a number of important characteristics: the ability to move large amounts of material steadily over long distances; adaptability to a wide variety of weather and terrain circumstances; and low-cost land transport for bulk commodities. Both are expensive in capital costs, and require relatively high volumes and utilization if they are to be justified.

Certain factors about the Canadian North emerge as

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key considerations in contemplating the use of either of these modes in the region: the need for bulk movement that the mineral resources imply; the lengthy distances to tidewater and markets, and the commensurate importance of freight costs; the prospective imbalance of outbound products over inbound goods; the necessity for preserving environmental qualities, and for having a transport system that can cope with the extreme climate conditions.

Only two railways now operate north of the 60th parallel, and both are heavily oriented toward mineral traffic. These are the privately-owned White Pass & Yukon, which connects Whitehorse to the port of Skagway, and the Canadian National's Great Slave Lake Railway, which runs southward from the lake to a connection with the Northern Alberta Railway. No solids pipeline has as yet been installed in the North.

Physical factors, such as the specific type and volume of commodities to be moved and the particular origin and destination points, will weigh heavily in what transportation system is selected, as will the environmental circumstances. Economics, however, will impose the final test, whether the transport facility has a single or multi-purpose use. Decisions made on railway and solids pipeline possibilities in the North will have a substantial influence on decisions made not only on support facilities such as ports but also on alternative transportation means.

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Mr. M. Archer:-Thank you Bill. There is also another change in the program and Mr. Latimer has been replaced by Mr. Taylor who will speak now. Mr. Taylor is manager of Northern Operations White Pass and Yukon Route. Mr. Taylor.

INTEGRATED TRANSPORTATION IN THE YUKON

BY: MR. R.R. LATIMER

Presented By: Mr. M. P. Taylor

SUMMARY

The White Pass and Yukon Route has had an association with the Yukon and its transportation since the turn of the century. In the early 1950's the decision was made to introduce an integrated transportation system to this part of the North; since then, an integrated ocean-rail-highway system, which makes use of several different types of containers, has been developed. The latest major step has been to design and implement use of an ore concentrate container for a joint truck-rail haul from Anvil Mine to the Skagway sea terminal.

White Pass' general philosophy has been to gradually introduce new components into its basic system, and innovate steadily, rather than to replace existing useful equipment "at once" with the most sophisticated system. An exception has been the new bulk container system, where totally new operating practices, equipment and facilities were placed in service. The main advantages of the "piece by piece" approach are that: financially and physically, it may be the only practical way to

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get started; experience and the learning process can improve the performance of the final system; and training and adapting employees is greatly facilitated. "Instant" introduction of the complete new system, on the other hand, reduces compromises and permits a maximum of component compatibility. While each of these approaches has its advantages, the key factors to consider in making a choice are the adaptability of the personnel concerned and the degree to which day-to-day field performance of new equipment is likely to differ from test conditions.

Practical integration between modes, especially in the use of containers, is difficult to achieve. The leading problems that must be overcome are those of timeliness and consistency of equipment design, financial responsibilities for equipment and sharing of revenues, and control over both utilization and care of shared equipment. White Pass and Yukon has found that common ownership over the component modes has obvious advantages in resolving these areas. Flexibility and integration have been a successful way of coping with the unique demands of northern transportation.

Mr. M. Archer:-Thank you, Mr. Taylor. The next speaker is Dick Cox, CNR area manager. Dick worked on the location and construction of Great Slave Lake Railway and the Alberta Resources Railway. Dick Cox.

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RAILWAY CONSTRUCTION DOWN NORTH
BY: MR. V.R. COX

SUMMARY

The northerly 125 miles of the CNR line to Churchill, Man. was built mainly on permafrost and the benefits therefore are felt to this day. This portion of the line has required the lowest level of maintenance yet provides some of the best tracks of this system and winter-heaving is virtually nonexistent. The author believes that neither permafrost nor unstable terrain can prevent railways from advancing northward. Since 1950 the CN has built almost 2,000 miles of new lines mostly in the North. The major construction differences between railway and highway are:

1. The width of the way (4'8 1/2" between rails vs. 50' of highway)
2. The gradient (GSLR has maximum grade of 0.6% whereas the Mackenzie Highway has maximum grades of 6.0%)
3. Time to locate and construct. Railways are invariably built on a "crash basis".

Railway construction costs vary widely from project to project and average per mile cost is not a meaningful figure. Costs will be higher further north but recent techniques have established that construction work is practical in temps. to -20^o F. Railway is the best alternative to assist the exploitation of base metals and move mass tonnages to smelters and markets. The

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author believes their proven capability will come more to the fore in the '70s particularly to satisfy ecological demands.

Mr. M. Archer:-Thank you Dick. Our next speaker, and we're very glad to have him with us is Fred Joplin, Director of Planning, Canadian Pacific Railway. Fred is a graduate Civil Engineer of the University of B.C. and served as a pilot during the war with the RCAF. Fred Joplin.

INTERMODAL TRANSPORTATION
BY: MR. A.F. JOPLIN

SUMMARY

Slurry Pipelines - While capsule and slug pipelines also hold promise for highly-automated, low-cost commodity transportation, slurry pipelining is now the relatively most advanced technique. For slurry transportation, the material concerned must be capable of being processed to a fine state and recovered from it for use, and should not inadvertently react with the carrier liquid. Economic sources of power for pumping and an adequate supply of the carrier liquid must be available. Commodity pipelines best serve a single origin and destination, and generally cannot be easily converted from carriage of one material to use by another.

Volume is important to the economics of slurry lines: reserves of the material to be shipped should be assured, as

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should the commitment to steady use of the facility. Large variations in throughput rate must be avoided.

Favorable environmental factors are that pipelines are generally closed systems and therefore minimize fumes and dust; do not require large numbers of people for support; and can be placed below ground, so as not to create obstructions. However, absorption of transmission heat may have an effect on the adjacent ground, and disposal of the carrier liquid may involve difficulties.

Railway Development - Railways are highly flexible and offer favorable economies. Northern extensions of the present network are more desirable than a new northern east-west line. Commodity carriage will be the main justification and source of revenue for northern railways, with general freight and LCL traffic being lesser considerations; the passenger role appears neither promising nor profitable. Rail lines are two-way carriers and can bring in development supplies as well as transport outbound products.

Railways, as now operated, have a negligible effect on the environment; their basic construction materials also have little impact on the land through which a line passes. Limited problems can result from surface obstructions caused by railway structures or from material that blows from open rail cars. It is expected that railways will enhance the economic value of northern territory they may traverse, as they have

in other geographical areas.

Mr. M. Archer:-Thank you Mr. Joplin for your comprehensive exposé of the intermodality of two systems as well as the characteristics of each of them. This completes the presentation by the authors of the papers, and now the meeting is open to questions and discussion, comments, additions of what ever you want. Any questions?

SESSION DISCUSSION

DELEGATE - Mr. J.B.W. LeClerc, Surface Transportation Administration

I would like to direct the question to Mr. Cox. You've been involved in the construction of the Great Slave Lake Railway and Alberta Resources Railway both of which I think are considered high standard railways, mainline standard railways. On the other hand the PGE have been building at a relatively lower standard in B.C. and I would like to have your opinion concerning the developments in construction in the North. Do you think you would stick to high standards or would you build to lower standards as you go up North?

PANELIST - Mr. V. Cox

Well it's just like when you're going to buy a compact car or large one, it is whatever need you are trying to fill. If you anticipate you're going to have mass tonnages, then you've

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got to go for the least possible grade which you can get. If you feel you're only taking high class and low volume tonnages then you ascend the heavier grades at slower speeds and it also depends on how much money is available to go where you want to go.

DELEGATE - Dr. Trevor Lloyd, McGill University, Montreal

Mr. Chairman I would like to venture into the discussion of railroads as a consumer other than a specialist and make a few comments and ask a couple of questions. It has always been a hobby of mine to get as far north as possible by railways. It is a curious kind of hobby. It is getting less and less possible, because the railways don't like passengers anymore. But at least it enables one to comment that Canada has no reason to feel any embarrassment about the quality of its construction and the enterprise shown in the building of its northern railways or the technical difficulties to be overcome. I think Mr. Cox mentioned remembering in building the Hudson's Bay Railroad that the engineers solved permafrost problems which 15 years later were still not understood by people building the Alaska Highway. This is an indication of how far ahead our people were. As for the operation of railroads and the far North there is nothing I'm sure likely to be encountered any more severe than the conditions on the east-west continental railways. Anyone who has gone through White River, Ont. in the middle of winter knows what can be done in the way of operating railroads.

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My hobby has taken me to the North of Scandinavia
nearly 71° North where there is a 5 or 6 mile standard railway
run by an oil company that not only operates in very severe
climatic conditions but of course through long winter darkness
and there is no difficulty at all. They took me to Murmansk
on the Russian railway a few years ago and they also operate to
about 70° North. The northern part of it carries cargo from
Kola out to Murmansk harbour for export. So I think that we
must assume that the technical problems are not the ones that
are likely to delay the northern railway development.

My two questions are quite simple, I'm a geographer
and therefore very suspicious of economists, and one of the
things that always worries me about the economic planning is that
nobody ever goes back after the job is done to find out how far
the economic forecasts were from the target. When the Great
Slave Railway was being built the consciences of the politicians
were doubtlessly eased somewhat by the economic forecasts they
were provided with. It will be interesting to know now, ten
years later, just in the round so to speak, to what extent the
actual economic forecasts in 1960 have proved to be adequate
in 1970. I would rather suspect it would demonstrate that
cautious venturing towards the far North is not as necessary
as one might suspect, that the railway has been a great deal more
profitable than anyone anticipated in planning it. That's the
first question. The second is rather a broader one, with a lot

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of maps in front of us and as a geographer I tend to think in rather broad terms. Would someone or some people take the technical knowledge that has been presented to us not only today but in sessions yesterday and earlier and say where in the North is it possible in the next decade that railways are likely to be built taking all the evidence that we have available. Is it an extension of one of the lines around the Mackenzie? Is it an extension of the line along the west side of Hudson Bay? An extension of the 72 yr. old railway from Whitehorse? Just where is it? In other words where are railways likely to be developed in the next decade because if it isn't anywhere then the discussion is of course entirely academic.

Mr. M. Archer:-Economic forecasting, as someone said - is a dangerous business. Mr. Collins would like to speak on that one, and I think after that Mr. Cox.

PANELIST - Mr. W.W. Collins

Mr. Joplin alluded to forecasting being a little difficult for the future. This makes forecasting look a little difficult in hindsight too. Particularly in respect to Great Slave Lake. We don't have here the specific statistics but in general terms the Great Slave Lake was expected to cost in the neighbourhood of 86 million dollars to construct. But it actually cost something less than this to build. Around 75 million as I recall.

So at the outset it got off to a good start by being less expensive than anticipated. In terms of the traffic generated there has been a much greater flow of material out and a surprising greater amount of flow northward than had been projected. If I recall correctly, the lead zinc traffic now constitutes something less than half of the volume on that line and this other part represents a very large degree plus business. I think that Mr. Cox has some figures on volume that may be of help to put this in perspective.

PANELIST - Mr. V. Cox

The original projection was that there would be 275,000 tons from Pine Point. This is now actually considerably higher, closer to the half million mark. In 1964, they started hauling on a construction basis but the line was starting to be built in 62. The first ore hauled out was raw ore not concentrate in 64, and as I recall for the last 3 years there have been small incremental increases both years in excess of a million tons.

With respect to the question of where the railways might be built. It's best to realize from the start that railways just can't go anywhere. They are subject to the configuration of the land. We have done a major reconnaissance in Northern B.C. and the Yukon, as a matter of fact 7,000 miles of helicopter reconnaissance to come up with a line that probably wouldn't be longer than 1,000 miles. Let's say to Dawson City. We've

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recently done some reconnaissance work in the Mackenzie and Prudhoe Bay. But to say lines go here or should go here is very difficult. There has to be an objective first I think.

Mr. M. Archer:-Would Mr. Taylor like to add something about the railway possibilities in the Yukon.

PANELIST - Mr. M. P. Taylor

I'll repeat the question I hope I have it right.

Are there any plans or forecasting for railways in the North?

I can only say that our company is very alert to the needs and the necessities of transportation in the Yukon and we have completed what we call phase one for an extension northward into the area which we are trucking out of now. As I have said we've completed phase one which is real surveys and group selections and so on. It's just a question now of another mine being proved in the area which will make it feasible. I would like to add that in planning all these transportation systems sometimes some very important factors are overlooked, and one of them basically is that a lot of the materials coming out of the North are for export into the world markets. And certainly it's just elementary that the closest route to tidewater to which you can get the stuff the better off you are. That's all I have to say, Mr. Chairman.

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DELEGATE - Mr. J. Robertson of Hay River

It has been said that the company at Pine Point are employing approximately 15% native labour and that the CNR are employing their share of native labour in the railway system in the North. I would like to ask the CN people who are operating the railway, how many native people they employed say two years ago - and how many are employed today? What are the reasons for this decline in native labour?

PANELIST - Mr. V. Cox

You assumed the decline, did you? I can't answer the latter part of your question because I haven't been in these parts for the last two years but during the construction we did start a scheme of bringing down Eskimos from the very far North. If I recollect we brought down a 100 not purely as labour, in fact right now our manager at a high level is an Eskimo, Mr. Porter. I believe Mr. Okpik's brother is one of our locomotive engineers right now. It was a new venture and it was successful in some ways and in some ways it wasn't. Mr. Okpik might like to make a comment on that.

DELEGATE - Mr. A. Okpik

The problem in this case, I will try to explain. I had something to do with the transporting and getting ready for the workers going out into the Great Slave Lake Railway on the request at that time of the operations manager of the Great Slave

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Railway. He came up with an aircraft and made a survey and wanted to know if anyone would be willing to work for a period of time. We had arrangements made for these people to go south and they had 3 - 4 months employment during the early part of March, April, May and June, and upon getting into July most of them came back. You know when it gets to be 80° or 88° above around the Peace River area it's pretty hot for an Eskimo to dig with a shovel and try and work under these conditions. This is one reason why they came back. But some of them stayed. A large majority about half of them stayed all during the summer and came back in the fall time, in the winter time, and went back again next year for the same reason until the construction was finished. The ones that stayed I believe were on a different kind of a programme. They had one that did some work on the DEW Line especially the ones that are there now. They all worked on the heavy equipment, those heavy cats and trucks. When they went into the railroad some of them were tested to find out if they could work on the engines and I believe this is what they have done to some of them. I know there are five of them at Grimshaw who are living there now, including my brother and four other people from various parts of the North.

DELEGATE - Mr. W. Berg of Hay River

I have a very short question for the CNR in connection with the Great Slave Lake Railway and in connection with the

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Mackenzie watershed. Have you given any consideration to pushing through a connecting line with the PGE at Dawson Creek? I believe that the existing lines that are in there are within 30 miles or thereabouts of this connection over good construction area. I was wondering if you have considered this to give us a less circuitous route through to the Pacific Coast?

PANELIST - Mr. V. Cox

Yes, that has been considered. In Mr. LeClerc's remarks I think he was getting at something there about the PGE. The PGE does have very heavy grading from Dawson Creek down to Prince George. The study was also made to connect from the Great Slave Lake down to the North Alberta Railway, Grande Prairie and then follow down the Alberta Resources Railway. This would shorten the distance from tidewater considerably.

DELEGATE - Mr. C. Vuckets of Hay River

I have some familiarization with that situation at Hay River, Mr. Cox. If I may just add a little more to John Robertson's query on the number of natives employed by the CNR. I think this relates quite considerably to much of this question of employing native labour in various capacities with development companies and business in the area. The problem, basically, that occurred with the native personnel in the construction of GSLR Hay River and points south of Hay River was purely a social

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one. I was personally familiar and friendly with a number of the Eskimo people that were up from Gjoa Haven and the areas like Sachs Harbour. For some reason they just couldn't take the restriction of working the set routines with this type of work operation. Peter Sidney who is very well known to probably many in the room, just couldn't wait to get back to the trap line up in Sachs Harbour. People like himself when they decided to leave and go back they were leaders to many of the other personnel involved. They in turn followed this type of person back. If he had stayed, if people like him had stayed and were able to conform with the restrictions of this type of employment, probably a lot more would have stayed as well. I think this is a problem being experienced by many of the companies and I did have some little discussion with Professor Deprez on this. In training local personnel to work with these companies the problem is not so much in the training of them but it is in the keeping of them in these particular jobs. This is a wide open area and I don't think there is any pat solution. It just has to be developed through a trial and error basis. Some companies have had a little more success in retaining this type of personnel than others, but again depending on the location and personnel you're working with. It seems the greatest success that we have seen or experienced is where we can take the job content to the local environment. If we could go up to Inuvik where these people are living and employ them at that particular location, we would have much more success

in stabilizing these people to the work that we provide for them. But if we have to take them out, and this is something Mr. Okpik suggested perhaps taking some of these people out of the environment and providing work for them away from their local environment, this hasn't worked out at all in the past.

Mr. M. Archer:-Thank you very much. I think we'll call it a day. I want to thank the panelists and every one of you that have come to this conference.

SESSION 7A
MARITIME BULK SHIPPING AND ICEBREAKER SUPPORT

CHAIRMAN: Mr. A. Pullin, President, Dominion, Marine Association, Mtl.

PANELISTS: Mr. D.M. Ripley, Dir., Marine Hydraulics, M.O.T., Ottawa
Mr. R.S. Grout, Manager, Marine Div., Imperial Oil Ltd.,
Toronto
Mr. J.G. German, Partner, German & Milne, Montreal

CHAIRMAN'S OPENING REMARKS

Mr. A. Pullin:-This panel was composed of four speakers, but unfortunately one of them, Mr. Jack Leitch was unable to visit us in Yellowknife due to business abroad in Europe. The subject for discussion here today will be that of looking into the future and incidentally using a crystal ball. Using a crystal ball because as we all know with the exception of the summer grain run out of Hudson Bay, bulk shipping is presently non-existent in the Arctic. The Manhattan exercise has of course focused attention on all your operations in the North, and indeed it can be said that if the riches of the Arctic are to be exploited then year round shipping is a must. The title of the panel subject includes the phrase "Ice-breaker support." We should remember that bulk ships whether they be tankers or carriers or gas carriers will have to be designed as ice-breakers in their own right when you realize they will be used for year round operations in the North. These vessels will be very expensive units to build and as of now we are still trying to think of rules on which to build them, through classification or otherwise. To those in the audience who think in terms of submersibles, as

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cargo carriers, a whole new set of standards will be required to be formulated for this type of carrier and I mention this point because to my knowledge there are no submarines registered with any of the classification societies around the world.

Our topic today is a vast one indeed and I'm afraid with the time at our disposal being rather limited we will only be able to deal in generalities and not specifics. However, the panel in preparing all their papers have gone through a great deal of time and effort in looking into specifics as far as it was possible. So, I would like to call on our first speaker Mr. Don Ripley. Mr. Ripley is the Director of Marine Hydraulics, Ministry of Transport Canadian Government in Ottawa. Mr. Ripley.

MARITIME BULK SHIPPING

BY: MR. D.M. RIPLEY

SUMMARY

Recent discoveries of oil and minerals in the Arctic, together with advances in technology and operations effectiveness, have stimulated an interest in a larger role for the maritime shipping industry in the carriage of bulk cargoes out of Northern Canada.

Bulk cargo sources are reasonably well established, but the actual quantities to be transported out of the Arctic and a time frame for full development of a maritime shipping system are impossible to forecast with any certainty.

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Considerable success has been achieved in the use of surface vessels operating with ice-breaker support, particularly in the Eastern Arctic. The more remote areas of the Arctic Archipelago and the Northwest Passage, although open for a limited part of the year for well powered and ice strengthened ships, is yet well beyond the limits of economic viability and operational dependability. New and imaginative ship designs and new operating techniques are being examined to extend the present limits of capability and to reduce transportation costs.

It is considered that both the Canadian shipping and shipbuilding industries have a part to play in the development of a larger maritime bulk shipping system in the North, and it is suggested that there is a place for closer joint action by industry and by government.

Mr. A. Pullin:-Thank you Mr. Ripley. The second paper is by Mr. Jack Leitch and I'll read it myself in his absence.

Rather a short paper I think but it is rather to the point. It should be of interest to all today.

MARITIME BULK SHIPPING
BY: MR. J. D. LEITCH
Presented By: Mr. A. Pullin

SUMMARY

Mr. Leitch notes that Canadian ship-owners have had much experience in bulk shipping operations, but that most have

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submitted to the need to close their operations during the winter. He is convinced, however, that Canadian shipowners, with cooperation and understanding of government, could exercise a leading position in bulk shipping in the Arctic.

To further such a joint engagement, there will be a need to alter radically existing attitudes and to revise basic policy to provide more government support. He notes that the Arctic belongs to Canada, and at the present time no-one outside of Canada possesses superior knowledge and skills in Arctic operations. Canada, therefore, has the opportunity to dominate in the movement of bulk cargoes by ship. Canadians should plan on being the world's outstanding specialists in this field.

As for policy changes, Mr. Leitch suggests a need for a Canadian-flag deep-sea fleet operating competitively with other nationalities. The government support provided in like circumstances in other countries is emphasized, such as subsidy, assistance in financing and reductions in import duties. A Government-Industry-Labour team is suggested to provide optimum results.

In the final analysis some means must be found to decrease capital costs and operating costs to the shipowner. It is argued that construction of ships in Canadian yards is a secondary consideration; in fact, ships over 100,000 dwt. cannot now be built in Canada. Cost cutting, according to Mr. Leitch, could be accomplished by designating the Arctic as

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a special zone of operations in which:

- a) Any Canadian-owned ship could enter Canadian registry without payment of duty. Offsetting subsidy and financial arrangements would be applied in instances where government wished that certain vessels be built in Canada;
- b) Labour costs should be abated through government assistance and a more realistic attitude by labour;
- c) Insurance costs, at present prohibitive, could be reduced by a special government arrangement for underwriting a part of the insurance for Arctic operations;
- d) A joint Canada-U.S. engagement through suspension of the Coasting Laws of Canada and the U.S. in respect to the movement of bulk goods out of the Arctic. Trade agreements in respect to the automobile industry are cited as a case in point.

Mr. A. Pullin:-Mr. Leitch would represent the independant Canadian shipowners' point of view. Our third speaker on the panel is Mr. Grout, the Marine Manager of Imperial Oil Company of Canada, and would represent on this panel the captive shipowners' point of view in that they build their own ships to carry their own products. They may be doing the same in the Arctic in the future too. Mr. Dick Grout.

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MARITIME BULK SHIPPING & ICE-BREAKER SUPPORT

BY: MR. R.S. GROUT

SUMMARY

Mr. Grout thinks that the subject matter of the panel "Maritime Bulk Shipping and Ice-breaker Support" is an exciting one as it is concerned with the possibilities for a major technological break-through in commercial shipping. Without such an advance the development of a large portion of the Canadian Arctic will be impractical.

The hard reality of bringing the potential natural resources to market at a competitive cost must be realized, and this is the basic factor of Mr. Grout's comments on the specific subject of bulk Arctic shipping.

Mr. Grout has arranged his paper in six broad headings:

- (1) Geographic location of possible commercial discoveries of minerals and petroleum that might be moved to the market by ships.
- (2) Evaluation of the possible market for such commodities.
- (3) The severity of the obstacles to navigation by areas in the Arctic.
- (4) The difference between mineral and petroleum development in the Canadian Arctic from a shipping point of view.
- (5) Discussion on the specifics of the cargo ships, ice-breaker support and other facilities that might be required (oriented to the petroleum industry).

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- (6) General observations with respect to the opportunity for the bulk shipment of commodities to market by the surface marine mode.

It is thought that Canadian Arctic Islands' oil might find Eastern Canada and the U.S. East Coast its first market. However, it is interesting to note that the distances by ship from the Mackenzie Delta to North Eastern United States, North Europe and Japan are roughly the same. Although the industrial heartland of the North American Continent (Chicago, Detroit and Cleveland) does represent a potential market, Mr. Grout feels that it would be served by continental pipelines. With respect to minerals, the additional distance and the constraints on ship size set by the St. Lawrence Seaway and the circumstances of a closed shipping season would seem to rule out sale to this market.

Specific opportunities for bulk marine shipping will require careful examination of market demands, the pricing mechanism in force for the commodity and, in some cases, the economic policies of national governments. It will also require an evaluation of the environmental obstacles to navigation.

The difference in approach to primary processing will probably result in generally higher value cargoes for minerals out of the Arctic than for oil. Oil would also present a more significant threat to the environment than would minerals. However, because of the high specific gravity of minerals resulting

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in a low utilization of the volumetric space in a ship the mineral carrier presents potentially greater hazard with regard to the safety of the ship and crew.

Mr. A. Pullin:-Thank you Mr. Grout for a most interesting paper. Our final paper is from Mr. Gord German the technical member of our panel. Mr. German is a partner of German, Milne, transportation consultants and naval architects. As a naval architect he supervised, designed and carried out studies for 17 ice-breaking ships and has conducted, on behalf of the Government, full scale instrumented trials of Canadian ice-breakers. I think Mr. German is very qualified to speak on the technical aspects of Arctic transportation. Mr. German.

BULK SHIPPING AND ICE-BREAKING SUPPORT IN THE ARCTIC
BY: MR. J. GORDON GERMAN

SUMMARY

Recent developments in northern maritime shipping are reviewed together with the principal problems: short season, lack of knowledge of ice, incomplete charts, and ecological questions. Within the last few years the answers to these questions are beginning to take form but the question of costs is still in many cases "ill-defined". However, the author affirms that he is "a true believer in the ultimate practicability of sea transportation in the Arctic waters regions." The paper

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considers the varying requirements for ships depending on the individual routes e.g. Foxe Basin, Hudson's Bay, East or West of Resolute, Alex Heiberg (High Arctic).

For large deadweights out of the Arctic, transportation costs will be high for ship, sub or pipe. Costs will be higher as we move further north. The author believes pipelines from the Islands will not be possible because of great depths of water and the scouring action of grounding ice. Surface tanker or bulk ship will probably offer best returns but each particular operation will require study because of the many factors involved.

Various ice-breaking bows and ships together with the various operating methods are discussed. Ships must have sufficient power to be capable of continuous speed through the ice conditions to be found on any route. Route analysis and forecasting are essential. A heavy "Polar" ice-breaker will be required for emergency assistance as a back-up to commercial shipping in the High Arctic. The size will probably be approx. 33,000 tons, power 120,000 hp.

Tug-barge transportation systems are considered in some detail. The author believes the concept is valid but primarily for short voyages, for special situations especially for transportation of construction materials. He does not see them for the transportation of raw ores. The "submarine" concept will be for all-season service across the top and to the North of 78°, supertankers or O/B/O vessels for South of 78°.

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Six areas are identified for action:

- Canadian Government Construction Regulations for Arctic Service
- Pollution Regulations
- Hydrographic and bathymetric information
- A suitable navigation system
- Environmental data - information & definition
- Establishment of acceptable insurance rates.

Mr. A. Pullin:-Thank you Mr. German. A most informative paper indeed. Now Ladies and Gentlemen at this time we are open to ask questions or comments from the floor. And if you would stand up and take the microphone, we would be very happy to hear your points of view.

SESSION DISCUSSION

DELEGATE: Mr. A. Okpik, Area Admin., N.W.T. Gov't., Pangnirtung, Baffin Island.

Ladies and Gentlemen, my name is Abe Okpik and I work for the Territorial Government. It is kind of interesting to hear comments on this ice-breaker deal coming through all this water. My comment will be on a different matter perhaps, nobody has commented on the proximity of the Arctic Islands and the mainland. I'm talking about Coronation Gulf and through the south of Victoria Island south of King William Island by Simpson Strait into Spence Bay possibly up to Bellot Strait and down

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through Fury and Hecla Strait. When you're dealing with the movement of ice and water and so on these are real technical problems I feel. Because I also fish out in a lake and if I went to that same fish hole and chiselled for two minutes and there is only about three inches of ice then I have already made a hole about 9 feet. In other parts of the world like the Suez Canal, or Panama Canal shipping goes through there possibly every hour and a half. My suggestion is just that in a bay between two lands, the ice is permanent all winter and if you could make a route every half hour, with a ship passing through, would you have as much solid ice? You'd have a ridge made up between the islands and so on, so that you wouldn't have any problem of current or movement of ice. This is my observation. I think that if you went along the coast anywhere in the Arctic there is always an island a mile or two miles off but in between those waters there is a lot of deep water too and this will keep the movement of ice away from the ship. I'm saying this because I always thought of ice-breakers good in that they are trying to fight 9 feet of ice where they can fight one or two feet of ice with the solidity of an island outside and hugging the shoreline like we used to travel. Now I'm not saying that we are the best travellers, but I think that in this case somebody should come up with an idea. I was talking to some people who said that this strait was all ice coming in from Community Bay. You can't flood all that strait because there are several islands there. Well heck I heard

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somebody blew up an island outside of Vancouver, and made a strait through. I mean this is a possibility and I'm trying to convince someone in this room. I hope that this type of thing might be looked into because there are lots of islands outside of the mainland which are we think impossible to pass but on the other hand the solidity of the land is what we are looking at. If you went out to Davis Strait or Baffin Bay or even Lancaster Sound you would have all this movement of ice and this is your problem. You have to fight the weather and movement of ice and the thickness of ice and everything. In this particular area you don't have to. All you have to do is to get the ship to go through there every one half hour every time and then you only have about an inch of ice to push through.

PANELIST: Mr. D.M. Ripley

I should like to say that this is an extremely useful comment. I believe Mr. Manning this morning remarked about the earlier ice-breaking operations when Captain Bernier was developing systems in the North. I'm quite sure when he called upon the local people to act as pilots, no doubt his success was based on this kind of knowledge. My own experience I must confess is rather primitive and certainly on a much smaller scale but it has been my observation in some of our areas where we have winter navigation such as the St. Lawrence area that the use of land masses, islands and artificial structures of one kind or another

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to induce an appropriate formation of ice is actually the way we should deal with it. We should not run head long into the natural aspect of this but try and moderate the whole action by making use of certain natural aspects of the mechanism.

DELEGATE: Cmdre O.C.S. Robertson, Northern Associates Ltd.

Simpson Strait is the limiting factor 6 fathoms is all you can carry through there. That is the deepest channel. The vehicles that this panel are talking about draw up to 70 or 80 feet to carry the oil economically. It would be lovely if we could take it through the lower passage, because there is less ice. Unfortunately, there is not enough water. To come out from Bellot you are handling a monstrous ship in a very narrow strait with quite a tidal flow with whirlpools off Magpie Rock. I shouldn't like to take anything through there, much bigger than 15 - 20,000 tons and then I think some of my colleagues might suggest that I had a hole in my head. To get down through Committee Bay and Hecla and Fury Strait, again, the same situation. So, it's not that we haven't looked at the channel, we sure have because if it just had a little deeper water this would be the answer. You would be playing with 35 inch ice instead of 9 foot ice as you say for a continuous passage. Sir, if this could have been done there might not have been the need to have this conference.

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DELEGATE: Mr. A.C.R. Alberty, Gibb, Alberty, Pullerits & Dickson

I would like to pose a question to Mr. Grout, who mentioned the high cost of liquid storage in relation to trans-shipment. I understand the high cost of storage being a factor in acquiring an all year-round marine shipment. This is a full twelve month operation so ten months, from the point of view of a trans-shipment let's say with one mammoth shipment arriving almost every day I would have thought the penalty would have been such that the actual cost of storing a barrel of oil would not have been very great. But if it is I would like to call out a further question with respect to the possibility of direct ship-to-ship transfer of oil?

PANELIST - Mr. R.S. Grout

Well, first of all you're quite right the penalty is much less on the trans-shipment example than on the closed season. However, it still represents an economic penalty. Both in the investment in the terminal, and secondly in the time required to off-load and then to load another vessel. You are just adding another time factor to it. But you're quite right it is not as great an economic penalty as say a three month closed season. With the average refinery economics, they talk let's say six or seven days of supply, as a normal kind of tankage that a refinery builds. You obviously see the multiplier principle there. Ship-to-ship transfer is another obvious consideration, and it's one

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that has been and will continue to be considered. It presents a certain problem, perhaps increases the hazard of some unfortunate happening but I didn't mean to rule it out. The trans-shipment I said tends to weigh heavily against it. In any case in which I have been involved, you are better off to build a ship to go the full way. Unfortunately we are talking about a subject in general and we really have to get down to where your oil is, where your market is, what the volumes are.

DELEGATE: Mr. A.J. Barrie, Imperial Oil

Mr. Chairman, Gentlemen. I am with the Imperial Oil Transportation Department in Edmonton. My question might not be a fair one but we would appreciate any comments the panel might have to give. In an oil spill, to prevent pollution, there would be considerable cost in containment and a cleanup. Where does the financial responsibility lie? Is it the carrier? Supplier? Cargo owner? Consignee? Could we have your comments please on that.

Mr. A. Pullin:-Yes, I think Mr. Grout has been involved in Ottawa on this particular subject.

PANELIST: Mr. R.S. Grout

I'd suggest you read the proposed amendments to the Canada Shipping Act Bill C-2 and that will answer your question

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as far as what the proposals are. The present legislation under the Canada Shipping Act places liability of damage on the ship owner and under present legislation the ship owner is entitled under certain circumstances to limit his liability, on a tonnage formula.

DELEGATE: Mr. A.J. Barrie

Has this to do with loss or claim or pollution clean up?

PANELIST - Mr. R.S. Grout

Both.

UNIDENTIFIED SPEAKER

A number of the papers have referred quite naturally to the very high cost of these high powered highly strengthened super-tankers, but I don't remember any of them to be brave enough to give an actual figure of what the cost might be, except maybe one paper mentioned the fleet of 20 tankers costing something like \$2 billion but that may have included accessories and other things. I want to ask Mr. German if he is prepared to give some idea as to what a 300,000 ton ice strengthened ship with adequate horse power might cost either in absolute terms or as a ratio to a normal tanker operation.

PANELIST: Mr. J. G. German

Yes I did indicate this in the main body of my paper. I don't know whether you got a copy or not. I didn't mention it

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this afternoon. A very ballpark figure, it would be about 60% higher than a regular 300,000 ton tanker. You are talking in terms of horsepower of upward of 200,000.

DELEGATE - Cdr R.D.C. Sweeny of Northern Region, H.Q., D.N.D.

Just a couple of quickies in relation to Mr. Leitch's very heart-warming paper; I note in one point he makes reference to the board of transport committee and the deliberations of the Merchant Marine Study in Canada. I know it is not strictly on the subject at hand but can anyone of your panelists or anyone in this room, tell me what is happening with those deliberations. We seem to have been waiting for one long time. My second question is for Mr. Grout. Sir, could you tell me in very round terms how much money Canada pays to foreign countries every year for the transport of oil that we import? Thank you.

PANELIST: Mr. D.M. Ripley

Well, I don't mind taking a crack at the first one. The Government of Canada is actually conducting two studies on matters in this area. One is specifically related to coastal shipping, the whole business of our coastal trading policy and it's no secret that this report has already been submitted by the individual who is consulting for the government on it. It is presently in the hands of the government and I would anticipate of course that they would deal with it quickly. It isn't to

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suggest, however, that this necessarily will be a beneficial thing for the shipping industry. I don't have to expand on that, judging by the comments made already. The other study which is also touching on this matter is the question of the desirability, if you will, for Canada to operate its own merchant fleet; perhaps resurrecting the old ideas that were extinguished some years ago. The study on that is proceeding along at a little more than a deliberate pace. Quite frankly I can't say when it will be finished. I would think likely possibly after the first of the year sometime but it is some distance away as yet.

Mr. A. Pullin:-Mr. Grout will you handle the second one if you can.

PANELIST: Mr. R.S. Grout

I'll try but I must admit I can't give the answer as to what the industry spends. I would point out a couple of things though. In the case of Imperial Oil we import crude oil to the Dartmouth refinery, to our Montreal refinery and to the Port of Portland Maine, and thence by pipeline to Montreal which is the major supply of all crude oil to the Montreal refining complex. In our case approximately half of our tonnage requirements are represented by two ships which are owned by a wholly-owned subsidiary of Imperial oil which I think is registered in Bermuda under the British Flag. I think this does point out something,

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I think there has been quite a bit of misunderstanding in terms of being competitive for a deep sea fleet. Referring back to my paper I mentioned that with the development of a large bulk carrier today some of the old concerns, comparisons on labour costs, etc., well they still exist. They are not a big factor in let's say a 250,000 ton ship, your labour cost is in the order of 10% of the total. The big factor of why we don't have a deep sea fleet in Canada is basically the tax situation and to compete effectively in the international shipping industry, you must be located in either an area where there is no tax or little tax. Norway which is a small country, but has something like number 3 or number 4 of the world's tonnage, the income on the tax on shipping operations is something like 15%. So I think there is a great deal of misunderstanding on that. The reason also why I couldn't answer your question on the industry is that our competitors don't tell us all about their arrangements. Now some of our competitors have like situations in terms of off-shore companies that own ships. But, I think this is a much misunderstood factor in the whole question of foreign flags.

Mr. A. Pullin:-Thank you Mr. Grout. Now our time is up gentlemen. I'm sorry it's 4:30. I will roughly summarize what the discussion was all about today. It would appear that some surface or sub surface transportation by ship or submarine would be the cheapest in cost. It seems the user will pay for any Government help,

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whether ice-breaker or other surface. High insurance costs could be injurious to the opening-up of the Arctic. Suggestions have been made that all operations should be reserved for Canadian ships and crews but the Government should help or should allow Canadians to import foreign built ships free of duty. The ship yards wouldn't like that recommendation. Due to circumstances, particularly geographic, minerals may be the first to be shipped in bulk from the Arctic rather than oil. The Arctic bulk transfer transport will in the future be divided between a super submarine concept for all season service across the top, and to the north of 78° latitude, and the super tanker O/B/O vessel for those latitudes at points to the south of latitude 78°. The Government of Canada has still a lot of work to do in respect of regulations for construction of ships for the North, pollution control and prevention, hydrography, setting up a suitable navigation system, supplying of environmental data etc. etc. Gentlemen thank you very much. I must thank the panel for their very fine papers here today and all that went into putting them together and thank you gentlemen for your questions from the floor.

SESSION 7B
AIR CARRIER OPERATIONS

CHAIRMAN: Mr. D.N. Watson, Past Chairman, Air Transport Assoc.
of Canada, Vancouver

PANELISTS: Mr. J. Courtney, Research Economist, CTC, Ottawa
Mr. K.P. Peiffer, Vice-President, Traffic Development, Nordair Ltd., Montreal
Mr. Max Ward, President, Wardair Canada Ltd., Edmonton
Mr. R.A. Morrison, Vice-President, Transair Ltd., Winnipeg
Mr. R.P. Engle, President, Northwest Territorial
Airways Ltd., Yellowknife

CHAIRMAN'S OPENING REMARKS

Mr. D.N. Watson:-It is a real privilege to have with me today what I consider is a very important panel on air transportation with some of the more knowledgeable people on air transportation not only in Canada but perhaps in the whole world. I know that this is a Northern Transportation Conference and yesterday's air transportation panel was very interesting, very informative, and very useful. I hope that this one will be equally so today. I wouldn't want to take anything away from the importance of the pipelines or the barge systems or the potential railroads or the potential highways, but I must say to you Ladies and Gentlemen that if it were not for the first prospector that went in with a canoe tied on the side of the Fairchild 71 or a Fokker Super Universal, there might not be a Yellowknife today in which to have an opportunity to meet. While I'm not suggesting that there has been any deemphasis on air transportation, I believe many other forms of transportation are important to the North and frankly I for one in air transportation believe that highways are

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the most important thing that could happen to the North. However there has been so much emphasis on other forms of transportation that I would like you in all seriousness to direct yourself to the observations that the panelists have for you here today, in terms of air transportation in the North. Our first speaker is with the Canadian Transport Commission in Research Economics: Joe Courtney.

AIR TRANSPORT IN THE CANADIAN NORTH
BY: MR. JOE COURTNEY

SUMMARY

This paper examines the commercial aviation industry in the Northwest Territories by setting out the routes and volumes of traffic without trying to provide answers as to optimum transportation networks. It is based upon a special survey of 63 carriers, and covers the period April, 1968 to September, 1969. The author notes the predominance of the three regional carriers (PWA, Transair, Nordair), and of DHC series aircraft (Beavers and others), and Boeing 737's and Hercules in the larger aircraft field. Four alternative ways of establishing a lateral link from Yellowknife to Frobisher Bay are examined; the northern route (Yellowknife-Resolute-Frobisher Bay) is currently unacceptable owing to poor connections, but if this could be overcome this would probably be the best alternative. Charter services from Yellowknife through Churchill to Frobisher Bay may

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also be a feasible solution.

Mr. D.N. Watson:-Thank you Joe. The next member of your panel is Kurt Peiffer, who is Vice-President in marketing for Nordair.

AIR TRANSPORT IN NORTHERN CANADA
BY: MR. K.P. PEIFFER

SUMMARY

The paper examines briefly air transport policy statements by the Minister of Transport and the National Transportation Act of 1967. It is noted that existing policy gives no recognition to the essential social role of transportation in the North and the author contends that air services over the years have generally been established on an ad hoc basis with little planning or direction from the Government. The paper reviews how the principal routes evolved and the role they have played and are playing in the economic and social development of the North.

The benefits resulting from the introduction of frequent and regular jet service on the three main routes have brought a whole new way of life to the North. The author quotes the Air Transport Committee. "All three services (Nordair, PWA and Transair) are essential to effective air service within the Northwest Territories. It is, therefore, of great importance that these carriers remain economically viable."

The author believes that government air chartering and contract practices are often inimical to the health of the

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air carriers, although there are recent signs of improvement in this regard.

The paper outlines the various devices that Nordair have introduced to equalize seasonal variations. There is still much to be done in this respect and in other areas of northern operations and he believes that the North would benefit from a closer working relationship between the carriers and government authorities.

Mr. D.N. Watson:-Thank you Mr. Peiffer. Our next speaker is a real true Canadian free enterpriser, hard driving, hard working, believes in everything that is good for Canada, one Max Ward. He needs no further introduction, I assure you. Max.

AIR TRANSPORTATION IN THE CANADIAN NORTH
BY: MR. MAX WARD

SUMMARY

The paper checks the present state of air transportation in the North against the purpose of the conference i.e. "to discuss northern transportation in the 1970's for the purpose of contributing to orderly social and economic development, compatible with protection of the environment, through the provision of an efficient, economic and adequate transportation system." The author suggests that the present system is adequate in that the requirement to move passengers and freight in the North is being met. However, he does not believe that the

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"efficient and economic" objectives are being met "adequately" in that they are not being met to the same degree as in the more southerly latitudes of Canada.

The major lift capability available in the South could also be utilized in the North if suitable airports were available. As a result the more efficient big jet aircraft would bring northern rates in line with southern ones. Airports at Inuvik and Resolute should have standards comparable to southern-Canadian airports and distribution centres for commercial enterprises will develop. The North will develop by establishing airport ground facilities that meet the requirements of the aircraft.

Mr. D.N. Watson:-Thank you Max for your typically forthright approach to the air transportation requirements of Canada. The next panelist is qualified in many respects not just in air transportation but in his vision of the Northern requirements, in his vision of total transportation requirements in the intermodal sense. Sandy Morrison.

AIR FACILITIES POLICIES
BY: MR. R.A. MORRISON

SUMMARY

This paper discusses the policy aspects of air transportation infrastructure and stresses the overall importance of adequate facilities for a healthy industry. The central Arctic is

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behind the Eastern Arctic and the Mackenzie River Valley areas in the standard of air facilities provided and this has retarded development because modern sophisticated aircraft can be used at only one runway in Keewatin.

The author believes Canada is on the threshold of a great frontier and must seize the initiative with the vision, tenacity and commitment of those who sponsored the trans-continental railway ninety years ago. To this end, a basic infrastructure for an Arctic transportation system is required as well as a long range statement of goals and objectives. He also advocates the formation of an Arctic transportation agency to oversee the implementation of programs to meet the national objectives for the Arctic.

Mr. D.N. Watson:-Thank you Sandy. Our next panelist is a very capable northern air carrier president who can tell us of some of the requirements of this very important part of the Canadian geography. Bob Engle.

AIR TRANSPORT AND NORTHERN DEVELOPMENT

BY: MR. R. P. ENGLE

SUMMARY

Although air transport is dominant in the North, with the recent acceleration of development there is a growing range of competition from rail, road, ship and barge. Nevertheless, there is not the same kind of intermodal competition which exists

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in the South and the author is concerned that air transportation will be stifled through regulatory rigidity.

Each transport mode should be permitted to expand in order to exploit its inherent advantages and this expansion should be encouraged rather than discouraged as it is at present. Peak demands should be met by Canadian carriers. Government departments should spread demand through the year. Foreign carriers should not be brought in to meet peak demand. The author also advocates closing the east-west gap. The air policy for the North should reduce competitive restrictions thereby invigorating not only the northern carriers but Northern development as well.

Mr. D.N. Watson:-Ladies and Gentlemen you have heard all of these panelists. We have about 12 minutes for questions.

SESSION DISCUSSION

DELEGATE: Mr. R. Kapchinsky, Pres., Kaps Transport Ltd.,

My name is Ron Kapchinsky. My question is at the panel and they are all air carriers. Why is it all the air carriers are trying to get into larger aircraft and to service with larger aircraft when there is a need for the small aircraft to take the freight on to its final destination? Now this really pertains primarily to the oil industry where they build shorter airstrips,

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say out at Resolute or a strip out on Banks Island. We still have to take a plane from there. We find to get this type of service for our company that there is a shortage of these types of planes. We find that the carriers get into larger planes and have the tendency of forgetting about the small aircraft and passing it up.

Mr. D.N. Watson:-Thank you Ron. I'm not totally qualified to answer the question but I'm going to take an opportunity to answer the first part of it. I also can't figure out why everybody wants to get into the large airplanes. But there are people very competent people on this panel who can answer the questions. Maybe Bob Engle could help you with that one.

PANELIST: Mr. R.P. Engle

I would say that we are represented here today with two regional carriers, and Canada's largest supplemental carrier in Wardair and a northern operator such as Northwest that I founded. There are a number of group B smaller operators, Ron, that you would be familiar with. This is a relatively new market having developed with the oil and gas exploration on the North Slope and in the Arctic Islands. I couldn't agree with you more. There is a need for the small aircraft operator. I think the recent decision of the committee licensing an operator here in Yellowknife is an excellent example of the recognition of that

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need.

UNKNOWN ESKIMO SPEAKER

I'm not going to say very much. I'm a little bit shy, you know. I've been meaning to say this before. I just want to say something for myself. I'm from Resolute Bay, in the North West Territories. I've lived up there since I was born. About the supplies, air supplies and ship supplies. We have a club up there at Resolute. We also get the supplies from Montreal by ship. The orders sometimes don't come, and when we run out of supplies, we have to order by air. Last month I ordered food from Pond Inlet by the air, 37 lb. of fish that cost me \$11.12 from the store. The air freight was \$19.00. The freight cost more than from the store, that makes me a little poorer. However, I can tell you very much about this. The people up there can't sometimes go hunting, sometimes they have to order it by the air. When they run out of stuff. Anyways most of all I would like to say, I'm sorry my English is not too good. Nothing is growing up there. Vegetables anything, if we want it we have to order it. Nothing grows up there except kids.

Mr. D.N. Watson:-Even if it is kids, it's a great contribution to Canada because they are very, very great people in that particular part of the country. Thank you for your observation. I'm sure that I don't have an answer for you, and I don't think

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anyone on the panel would have an answer for your problem because it is a matter of demand, a matter of equipment availability. The amount of requirement you have to move goods determines the size of airplane you use, and determines the cost because, cost is a product of speed and size, and if you can build a great big airplane that will go 400 miles an hour, you're going to get it pretty cheap, but if you're going to have to use a "185" it is going to cost you quite a bit of money. I don't know if there is a real solution to your problem. Questions?

DELEGATE: Mr. John Steen, Advisory Council of Tuktoyaktuk

Thank you Mr. Chairman. I'm John Steen from Tuktoyaktuk. I'm the Chairman of the Hamlet Council there, and I'm honoured to be invited to this convention and when you usually accept an invitation you must have a problem on your mind. So I came here with a problem in regard to the airport and I thought I could contribute to this convention by coming here with this problem. The DEW Line airport at Tuktoyaktuk is controlled and operated by Federal Electric Corporation, and if any other air carriers want to come in there they must first obtain permission. Therefore, it takes a long time before you can get a reply. So, I thought that DCT should take over the air facilities there and lengthen the runway which is presently just under 4,000 ft. It can accommodate a DC-3 but it can't take anything bigger. So, last year we had 70 aircraft come into Tukoyaktuk in one day and

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they couldn't land. Most of them were turned back because they didn't have permission. We had a lot of tourists and could help develop Tuck, as we often tell our settlement. It would also contribute to increase our economy by tourism coming into the settlement. It might be even helpful to the oil industry if the strip was long enough so they wouldn't have to unload at Inuvik, and therefore reduce the cost of developing the country.

Mr. D. N. Watson:-I would like to thank the panelists and everyone here for coming to the Conference.

VOLUME 1SECTION 4 - PLENARY SESSION

CHAIRMAN: Hon. Jean Chrétien

SPEAKERS: Panel Chairmen

"Well then our course is chosen
- spread the sail. Look to the
helm, good master, many a shoal
marks this stern coast".

Shakespeare

SESSION 8
PLENARY SESSION

CHAIRMAN'S OPENING REMARKS

Hon. Jean Chrétien:-Ladies and Gentlemen, we are now moving into the Plenary Session, where we will receive the reports from the rapporteurs. There are 10 of them, so I will ask them to be brief and concise. We will give you three minutes to report, after that we will have 15 to 20 minutes for people who would like to make some general comments about any topic they want. We don't want to start debates, unless some are persuaded by the comments to pop up and reply, but I would hope that this will not happen.

We will adjourn after the Plenary Session and will have a few hours free. After that everyone, I hope, will be present at the dinner.

I would like to call first on Mr. R.P. Engle to make his report.

Mr. R.P. Engle - Panel Chairman on Meteorological Service, Air Navigation Aids and Airport Facilities.

Hon. Minister, Ladies and Gentlemen. I felt we had a really distinguished group of panelists including Gordon McDowell, the Western Regional Director of Air Administration who gave us a promising picture of an increased network of non-directional beacons using small propane fuel thermo electrical generators requiring minimal maintenance. He further enlarged on plans in

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the MOT for navigational facilities north of 60. Our second very distinguished panelist, Maurice Baribeau, described a strategic plan for airport networks in the Arctic centering around six hub airports serving large major aircraft. He pinpointed these hubs as Whitehorse, Inuvik, Yellowknife, Churchill Resolute and Frobisher Bay. Mr. Baribeau is the Quebec Regional Director of Air Services responsible for Baffin Island and the Arctic Islands from headquarters in Montreal. Our third distinguished panelist, Frank Benum, Chief of the Forecast Service with the Ministry of Transport brought much experience on Arctic meteorological services. He outlined the features of a relatively inexpensive increase in Met. facilities within the Arctic. This would meet the data requirements for research purposes and provide prompt aviation weather reports and more accurate application of data for forecast and other requirements. The last panelist, Gordon Bartsch, a working pilot and air carrier manager emphasized the need for an area navigational concept. He has had the same experience as pilots like myself have had in crossing the Barrens and leaving navigational reference behind several hours with no navigational reference in between and then sniffing out and picking up the terminal beacon and heading inbound. His concept would be an area navigation rather than point-to-point navigation only as it is today in the Arctic. The last panelist was not able to be with us due to weather conditions in the Arctic, Weldie Phipps, and as chairman I read

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Weldie's paper. Weldie also supports the area navigational concept as well as improved aids but touched particularly on man in the Arctic: The problem of retaining experienced ground crew and air crew. He touched on the point that salary alone is often not enough. Thank you very much Mr. Chairman.

Dr. G. Jacobsen - Panel Chairman on Eastern Marine Resupply
(Including Heavy Helicopter Operations)

Mr. Minister, Ladies and Gentlemen. The Eastern Marine Supply Panel had a presentation by Admiral Storrs who described the marine operations and gave figures showing the projected increase in tonnage over the next few years, assuming that oil is found. He showed us separate figures for oil and general cargo. Later on different methods of transportation in smaller and bigger and ice strengthened ships were discussed. One main conclusion was that Arctic transportation is hindered in cost by the high insurance rates. Several people suggested that insurance rates are high because the people who set insurance rates do not know the conditions and should be told some facts. Insurance is not so expensive as they think it is. Pollution came up as a danger of accidents in the Arctic through oil spills and others; then Prof. Brochu of the University of Montreal suggested that the ice season be lengthened and said ground observers help in ice observations. Also he suggested the Russian method of reducing the ice coverage by putting soot and

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sand on the ice. Finally Mr. Martin from Chimo Shipping in Quebec suggested the building of ice strengthened freighters. However some business people commented that this would be too expensive.

Mr. J. Parker - Panel Chairman on Northern Roads, Trucking and Off-Road Transportation

The panel that I was the chairman of, heard first of the northern roads programme with some statistics on the network of roads that have been built in the Northwest Territories and the Yukon during the last several years. It was learned that \$10 million has been spent on the northern roads programme to produce roads and to maintain them. It is important to note that the cost of maintenance is included within the \$10 million, therefore the number of new roads that may be developed decreases somewhat with the increase in cost and amount of maintenance necessary. We heard of the development of off-road vehicles and we were told that Canada has an important industry which seems to be in the forefront in this field. We had a very good discussion on air cushion vehicles with the pros and cons expressed. However, the average view had to be that these vehicles were increasing in importance very greatly, that technology was still new particularly to Canada and the future was very bright for these vehicles. We had a report on the use of winter trucking and we found that, as many of us knew, winter roads are a

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very good method, very reasonable and useful, for transporting heavy equipment and heavy loads to areas which can be served over ice roads. The spectre of pollution was raised, particularly by one of our speakers, when dealing with vehicles. We had a good discussion on whether or not there should be more or less government regulation. There is some indication that the industry is anxious to receive direction as to what regulations may be imposed so that vehicles designed will fit within these regulations and not step outside of them. We heard also a good description of the roads in the Yukon Territories. The highlights of that I think to most of us were the costs involved in making them dust proof: the use of calcium chloride or the ultimate, pavement. I think Mr. Minister that pretty well sums up our group.

Mr. W.M. Gilchrist - Panel Chairman on Western Water Transportation
(Including Effects of Building a Mackenzie
Valley Pipeline).

In this panel we tried to give you some idea of the extent of our operations, the rapid increase we have experienced in recent years, some of the problems of operation as they exist and also something of that very technical problem of design of shallow water equipment. Also we had a glimpse at what we may expect in the future and it's rather startling. Also we tried to get across and explain the importance of the Mackenzie as a central artery in the actual servicing of the oil and gas development as we see them coming. Now in the end we had

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Mr. Willson give us some concept or some outline of the possibility in his paper of the outlook for pipelines from the vantage point of his company. He also showed us a very magnificent and very well organized film of the experimental and developmental work that has been going on for the last year, year and a half and will continue sometime in connection with oil pipelines at Inuvik. A very significant and I think valuable effort. Thank you.

Mr. W.J. Manning - Panel Chairman on Ice Information, Marine Navigation Aids and Terminal Facilities

The consensus of our panel was that the ice information should not be stopped at the end of the navigation season, that it should be continued during the year to find out if there is a pattern in ice formation and movements. Information was given to the participants on the present system of aids to navigation that is floating or shoring throughout the Arctic. The River Mackenzie was mentioned and the need for a complete hydraulic study of the Mackenzie River system as soon as possible to determine what will be required to improve it and to make sure that the improvements in one channel are not causing damages up above. It was suggested that terminal facilities should be constructed in the Eastern Arctic to hasten the unloading of ships and speed the turn-around. Electronic aids were suggested for safer navigation and more accurate positioning. More complete hydrographic information should be obtained, also more accurate

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localization of land masses. Information on the Arctic of all kinds, engineering, weather and so on is today available in a number of government departments and agencies. Information on construction is also available from the constructors of the DEWLine and the Mid-Canada Line, the Canadian Navy, the U.S. Navy, the U.S. Coast Guard and it might be of interest also to try to find out from Russia any information where they have done more development than we have. This engineering data should probably be collected and we would hope that the new Arctic Transportation Agency might do that.

Dr. G.C. Butler - Panel Chairman on Transportation: People and the Environment

Mr. Minister I have the honour to present our panel's report on the influence of transportation on the environment and people. The history of exploration of the North involves great human problems which are still with us and are probably more urgent than ever before. This history of exploration begins with the whalers, then with the fur traders, the miners, nowadays with the petroleum producers and what will come next? The exploitation of the fresh water reserves, who knows, or after the oil reserves begin to be exhausted early after the year 2000 will the North be abandoned and its people allowed to go their way? All our panelists emphasized that the day is passed when exploitation can be permitted to go on without

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thought for Northern Man, his environment and his future. The engineering industrialists on our panel indicated what technological precautions we must take to guard against accidents and against environmental destruction. The sociologist pointed out how we must educate and train the northern inhabitants so that they can profit from the economic activities in their own country. The biologists urge that we give priority to the preservation of nature in its esthetic qualities rather than to the economics of transportation and the industrial operation. Finally the legislator indicated how these considerations should be enforced by legislation involving inspection, performance bonds and litigation. All four panelists urged measures that cost money and make economic development less profitable. Obviously there must be some balance between these costs and the benefits we expect. Who is to make the judgement about where the balance shall fall? In the discussion period that followed the presentations of the panelists, we were fortunate to hear the views of five spokesmen for the inhabitants of the Arctic. All these spokesmen emphasized that transportation developments in Canada's North should be oriented to service people and their objectives and not to be dominated by economic consideration so much as it is at present. Frequently mentioned examples were: the need for better communications between the people and the need for routes between the eastern and western Arctic. What all this adds up

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to is now as never before there is an urgent need for much planning and forethought for humanitarian rather than economic priorities. This should be going on actively but who is to do it and how? After arriving at these conclusions our panel was pleased that so many of you were here to be confronted with these questions, especially our two presidents of the congress the Hon. Mr. Chrétien and the Hon. Mr. Jamieson. Thank you.

Prof. J. Welsby - Panel Chairman on Transportation Facility
Costs and User Charges

Mr. Minister, Ladies and Gentlemen. In Session 6A the first duty of the panel was to point out to the chairman that the title "Transportation Facilities and User Charges" is simply another way of asking what prices should we pay for transportation facilities. For this service I was very grateful. It was pointed out that in western economies prices generally reflect the costs that are attributed to the production of the commodities in question, and our uses indicated the value that the consumers placed on the commodities and services. The uses of such pricing mechanisms allows investment in those commodities and services that bestow the greatest benefits on both consumers and investors. It was suggested that recognition of the important allocative role that pricing mechanisms play in the economy was one of the reasons for the Ministry of

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Transport instituting a policy of recoverable financing for transportation. That is to say that the Ministry is adopting a policy analogous to sound corporate investment practice. However, Mr. Cornblat the representative of the Ministry of Transport was careful to point out that the general principle implied in this policy is hedged with the conditional statement of "where practicable". It was noted that up to the present time the principle of recoverable financing has not been generally applied to Arctic transportation. Over the past five years the ratio of revenue to cost for the provision and operation of facilities in the North has been of the order of 20%. Several reasons were put forward for rejecting complete emphasis on the principle of full cost recovery with respect of Arctic transportation. Amongst the reasons that were put forward to appear to be worthy of special note: firstly in relation to investment in the North there may be significant benefit that accrues to those who are not the primary users of the facilities concerned. This is particularly true in a region in which there is a degree of under utilization of natural resources. One very important element of these natural resources is, of course, people. In such circumstances a strict adherence to a policy of total cost recovery could result in a net loss of welfare to all concerned. It was suggested that the relevant yardstick to use in determining investment priorities was the benefits the total region derived from a particular project in relation

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to the cost of that individual project. The second point that was raised was an equity question in which it was pointed out that whilst at a conceptual level transportation appears to be a rather indirect vehicle for redistributing income from one section of the community to another, historically it has been a fact that transportation has provided a socially acceptable vehicle for accomplishing this objective. In conclusion I would just like to say that the session was unfortunately unable to solve all the problems that relate to the cost of user charges as investment in relation to Arctic transportation, but I do feel that there were some concrete proposals made which should be of assistance to the orderly development of the North.

Thank you.

Mr. M. Archer - Panel Chairman on Northern Railroads and Solids Pipelines

Mr. Minister, Ladies and Gentlemen. First I would like to talk about permafrost. It was brought out that permafrost is not an enemy of the railway but an asset. It is a good foundation. Sometimes we wish in the railways that we had that sort of foundation further south. We would have less of a maintenance bill. Also with the new techniques of construction today you can build from seven to eight months of the year in the North where a few years back you could build only three or four months. As well if you consider that in Russia and in

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other nordic countries there are railways above the 60th parallel that are running, then we can run them here too. Railways are the only proven mode of transport, overland transport that can carry for long distances bulk commodities and a number of other commodities very reliably. Solids pipelines and railways in the North have something in common. They both demand very heavy capital investment at the beginning. To be economic they both require very high volumes of traffic. Once built the railway provides employment but once built the pipeline usually is highly automated with very little employment. Any development of a mode of transport involving very heavy capital expenditures would take into consideration the economic considerations and reconcile this with ecological considerations that are of paramount importance. Also the intermodality of transport was mentioned a number of times today. Transport as a physical distribution, fully integrated system and intermodality should not restrict itself purely to trucking with rail but also to possibly pipelines with rail and aeroplanes with rail. One author mentioned that the innovations that have been introduced in his railway were introduced gradually and guarding against introducing innovations too fast which don't always work out. In other words any innovations should be brought in by evolution and not be revolution and you have to take into consideration the human factor to changes. The most constant thing in the world today is change and the most constant animal in the world

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is man. He is not subject to rapid changes. The railways unfortunately don't offer much promise for passengers in the North and naturally we didn't talk about passengers in pipelines because no consideration has ever been given to moving passengers into capsules. There were a few interventions from the floor and it was suggested possibly that we give more consideration to the employment of the local population, the native population. Another one said that usually when we go into these major developments our forecasts are too conservative. Our post completion analysis has confirmed that they have been a bit conservative but the figures given by the industry usually are. There has also been consideration to the extension of the railway to the North and surveys have already been made, aerial surveys and other surveys, of the routes to extend railways both in B.C. and along the Mackenzie corridor. I want to take advantage of this few minutes left to me if I have them to say how impressed I was by this Conference. It's my first time in Yellowknife and how impressed I was by the enthusiasm and progressiveness of the native population as well as what some call immigrants, but I like to call them "new natives" here. Well Mr. Minister I want to thank you.

Mr. A. Pullin - Panel Chairman on Maritime Bulk Shipping and
Icebreaker Support

Mr. Minister, Ladies and Gentlemen. We had four

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panel members one of whom could not show up at the last minute. They all presented excellent papers and the report from the floor was in good measure too. The highlights were that the Manhattan trial concluded that bulk shipping in the Arctic is technically feasible but for Alaskan oil the pipelines are more economic. This is in some measure due to the fact that Alaskan oil is for U.S. domestic consumption and not an imported product. Canadian Arctic oil would not enjoy this economic advantage on the U.S. market and would therefore be at a disadvantage. Nevertheless with present pipe technology, tankers are the only way of transporting Arctic Islands oil. It would seem that solid mineral development might precede oil development. The last year or so has shown that great advances have been made in the understanding of the performance of a ship in ice and Mr. German was the expert here. It is now possible to calculate, with reasonable accuracy, the strength and power requirements for a ship to operate in a given part of the Arctic. This is related to the number of feet of ice which it has to move through. Mr. Okpik advocated to sticking to routes where the islands and land masses prevented too much ice movement and to reduce the incidence of pressure ridging and hummocking. However it would appear that in the areas of which Mr. Okpik was speaking about, the depth of the water was limited to about 20 to 30 feet and if we are talking in terms of 300,000 ton tankers and like ore ships these vessels of course draw about 70 feet of water and

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would require to stick to the more open Northwest Passage. In developing these large tankers for the Arctic 300,000 tons dead weight and 200,000 hp, costs would be some 60% higher than for an open water tanker for the same deadweight. Pollution was a point raised and the question was asked who will bear the cost of cleaning up an oil spill? Under present regulations the ship owner is responsible, although there is presently before the government a proposal that a fund should be built up by a levy of a few cents a ton of oil on tankers trading in Canadian waters. Mr. Jack Leitch's paper made one suggestion that the North should be reserved for Canadians and that seemed to draw a round of applause from the people assembled at the meeting. The final point Mr. German made was that the Government of Canada has still to do a lot of work in respect of regulations for the construction of ships, pollution control and prevention, hydrographic and bathymetric information, setting up a suitable navigation system and supplying of environmental data etc., etc. Thank you.

Mr. D.N. Watson - Panel Chairman on Air Carrier Operations

Honourable Mr. Minister, Honourable Minister of Transport, Ladies and Gentlemen. I have a rather difficult task because I was the last moderator on and this was only a few moments ago. And so I didn't have an opportunity of going back to the hotel that famous Herc village and formulating a proper

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document from which I could speak so I'm just going to come off quite simply with a very few points which seemed to be fundamental in everything I heard from our panelists today. One primarily is that there is a serious shortage of proper navigation aids available to all forms of air transportation in the Northwest Territories. This is partly brought about by the fact that the Northwest Territories have been growing at such a tremendous rate in terms of development and so on that the funds available from government have not been able to keep pace with the demand. Now basically I'm a believer that if there is something that you can do for yourself do it for yourself and do not ask the Government to do it for you, because governments as such do not have any money. They simply have our money and before they can do anything for us they must get money. So then there is the process of taking away and then there is the process of administration and then the process of giving away so if you can do it for yourself, do it for yourself and you will get more miles on the dollar. But there are certain limiting areas where, in the public interest, the government must participate because there are so many of the public involved. It is my respectful submission to the honourable Ministers present that the Northwest Territories are deserving in my opinion of a real serious look on the part of our major government in the matter of navigation aids, airports and facilities in order to stay in step with that ever-driving

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demand that there is to push further and further and further into the Northwest Territories. We are trying as air carriers to stay in step. We have got the most modern equipment in the world. One of our panelists suggested that we have spent a hundred millions of dollars as air carriers, the private sector, generally speaking directed to the Northwest Territories. But I am rather confident that we don't have a hundred million dollars worth of facilities in the Northwest Territories. So it would not be totally unrelated to take a look at whether we can get some money from Treasury Board to make some improvements in facilities.

One of our panelists indicates that there was so much rigidity in our regulations that it didn't give anybody an opportunity to expand or to properly serve the peoples of the North. That is his point of view. He is entitled to it but if there is some rigidity I think it is there for a fairly good reason. Frequency of service, regularity of service is something that the Ministry has been working for years to develop so that you know that you have flights on certain days or so many flights a day. These are an evolutionary product of some basic concept and to simply throw out the rigidity that has been imposed by the Ministry and to allow everything to go on an ad hoc basis, you might well find yourselves in a position where you didn't know when there was going to be an aeroplane operating because it could be anytime. I heard a term used by

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one of our panelists today referred to as "phased competition" and I suggest to you that my interpretation of "phased competition" is competition without any financial risk. In other words a licence to compete when the work develops but don't invest any money in it. That's fun, that would be a real lot of fun.

Mr. Minister I simply want to commend the Government of Canada and all of those of your people who worked so diligently to put together such a successful series of conferences. The numbers of people that you brought around are meaningful in the Northwest Territories and I am happy to say that as a representative of a company that is a substantial citizen of the Northwest Territories that it is encouraging to see that there is a focus and that there is an influence and an intensity of that influence on the Northwest Territories. Thank you.

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Mr. Chretien:-Thank you very much Mr. Watson. Now I would like to give the floor to those who have comments and spend 15 minutes or 20 minutes on that. I hope that those who have comments to make will make them brief. After that, you will have a few hours to refresh a bit and we will have a dinner at 7:00 p.m. We hope that you will all be there on time because Mr. Jamieson and I would like to go back to Ottawa to-night. There is a Cabinet meeting tomorrow and we feel obliged to be

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there in the morning. So, now the floor is yours.

Mr. Duncan:-Mr. Chairman, my name is Duncan and I am representing the Government of Ontario. I'm not an interloper. I'm here by invitation. But one thing that's come to my attention while listening to the extremely interesting and productive dialogue that has taken place at these sessions is that much of many of the remarks seem to me to be directed towards the regulatory body of the Ministry of Transport, that is the CTC, and my observation leads me to believe that their conspicuous commissioners are conspicuous by their absence and I am wondering if one can place any significance upon this if my observations are, in fact, correct.

Mr. Chretien:-You know, I don't have many comments to make about it. The only problem is that we answer for the regulations and we have recognized by their absence that the policy should be established by the politicians.

Mr. J. Tooley:-I'm Jim Tooley and I'm associated with the Nordair Company. I just have one or two comments that I would like to make, and they are directed to the Ministry of Transport. I would just like to point out that there has been much talk about the improvement of airports and the facilities in the north country. There are two airplanes operating in the north country:

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a Twin-otter and the Skyvan which are STOL aircraft. I think that these airplanes are penalized by the presence of air regulations. They're all capable of operating from fields of shorter lengths than that for which they are certified and if their capability were fully recognized, the money being spent on airports may well be saved.

I would also like to say that I think that the desirability of a planned transportation system in the Arctic has been established by the papers that have been submitted to the conference and by the discussion that has taken place. There has been quite a little bit of talk about the necessity for east-west airlink; by a transportation system I think we mean scheduled air service. I would like to say that if out of this conference comes a desire on the part of the Transport Department or the policy making body to co-ordinate all the movement requirements in the Arctic into an east-west scheduled system, we shall have an east-west scheduled system service very shortly.

Mr. Chretien:-Thank you very much. I understand that there is someone who wants to speak.

Mr. Firth:-Mr. Minister, my name is Wally Firth; I'm with the Indian-Eskimo Association of Canada. I have been attending most of the conferences here and have heard of the good intentions

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about involvement of the native people of the Northwest Territories in transportation and I don't think that as much is happening in the involvement of these people as can be done. In particular, I think of hiring people to run our airports, the transportation system, the maintenance of the Mackenzie Highway and some of these areas. I would like to suggest that the people hiring personnel to operate our airports should pay a little more attention to the line that usually says "preference will be given to a candidate in certain areas." This hasn't really been happening because I am sure that preference has been given to southerners to run our airports for one thing. This looks apparent, too, on the highway systems and the Northern Transportation Company. At one time the Mackenzie River Transportation Company had to depend to a great extent on the native people to operate the system and a lot less now than there was years ago because the people knew the river and so the company depended on them for their pilots, for woodcutters and so on during the days of the steamboat and it has changed now. The river's all marked and you don't seem to have so many native people there. But the one area I think is the running of our airports. We have had a few airports up here for twenty-five years or more and there are very few native people operating these airports. I think we have the trained personnel in the area of equipment operators, truck drivers and so on for operating and we also have people who are capable to work as clerks, airport managers and such,

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and I wonder if more attention should be given to this and give these people a little more preference. One other small area I would like to suggest, I think might be a good idea; I think an Alaska airline company is hiring native people including native girls as stewardesses, as cabin attendants, and I would like to see the airlines operating in the North given more encouragement to do the same. Thank you.

Mr. Chretien:-Thank you very much Mr. Firth. I think that the audience has received your remarks very well. We know there is a place for improvement in the employment of natives. I think that the airlines will be more attractive when we have good-looking native girls on the planes. That will give a flair that will be appreciated by many of us.

Mr. Robertson:-Robertson, Hay River. I have a couple of comments to make that haven't been brought out in the Conference forcefully, or as far as I am concerned, forcefully enough. I think that everyone here is aware that Hay River is the seat of transportation, communications and telecommunications for the Territories. I think this has been made fairly plain and fairly clear and fairly obvious. However, I would like to follow through on that and say that our port facilities puts through or put through in the last several years, many millions of gallons of volatile fuel. There are no firefighting facilities capable of handling

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any problems that may arise from accidents or otherwise from handling such large volumes of volatile fuel. The port facility is very small and the whole port facility could be destroyed very readily should a problem of this nature arise.

The second thing is that with the seat of the fishing industry with probably upwards of 50 or 60 fishing vessels operating out of the port of Hay River with many many commercial vessels and a large number of private vessels also operating out of the port of Hay River and the airport facility fronting on the lake, we have absolutely no shipping capable of taking care of any accidents that may occur on the Great Slave Lake or around the Great Slave Lake or in the immediate vicinity of the end of the airport. Should an aircraft go off the end of the airport, we have nothing capable of going out there in sufficient time to do any good. In a place like Vancouver, for instance, we have no less than five high-speed rescue cutters and various types of rescue craft capable of getting out to the scene of an accident at very short notice and I think that this ought to be looked at before an accident occurs making it necessary to supply this high-speed rescue equipment to service the Great Slave Lake area. Thank you.

Mr. Chrétien:-So that concludes the preliminary session. I would like to thank all of you for being here. I would like to make a comment before closing. At the banquet there will be a

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speech - a small speech by myself and a longer speech by Mr. Jamieson and we will deal with some of the problems that you have raised at the conference.

Thank you for attending the conference in such large numbers, for your enthusiasm and for your devotion to the North.

VOLUME 1

SECTION 5 - CLOSING BANQUET

SPEAKERS: Hon. Jean Chrétien

Hon. Don Jamieson

"If you do not think about the
future you cannot have one."

John Galsworthy

CLOSING ADDRESS BY: THE HON. JEAN CHRETIEN
MINISTER OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

We are winding up this very successful conference tonight but before I make what I promise will be a short speech, I would like to introduce to you tonight three members of Parliament who are in the audience; Mr. Gerard Duquet, Member for Quebec East and the Parliamentary Secretary to the Minister of Transport; Mr. Judd Buchanan, Member from London, Ontario and my Parliamentary Secretary, and Mr. H. Pit Lessard, Member from Montreal Lasalle and President of the Transport Committee.

Ladies and Gentlemen, tonight we have every reason to be happy. During the last two days we have covered a lot of ground. My biggest satisfaction comes from the fact that if we had held this kind of conference four, five or six years ago the people would have talked about only one thing: how we can get things out cheaply from the North or to the North. However, during the last two days the panelists and the discussions have shown a real consideration for the people of the North.

I was very happy that many of the participants in the discussion and those who talked from the floor were concerned about the place that the development of transport and all the development of the North will reserve for the native population living north of 60. What was very encouraging to us was to see some of them who got up and spoke and expressed their concern, their views, their priorities about northern transportation and other developments in the Northwest Territories and the Yukon. That kind of participation was for me and for all the

people representing the Government at this Conference very encouraging.

Also referred to, was a problem that was not even mentioned a few years ago: the preoccupation that people have now about the environment. Canadians want to develop the North they are very keen to make sure that the last frontier in North America will be developed properly. They are keen that the North will not be a place where we will repeat the errors that we made in developing the South. This message came out very loud and clear in all the presentations and the comments made by the participants.

The emphasis given these two aspects was very rewarding for me as Minister of Indians Affairs and Northern Development and my people who work with me because we are trying to make sure through our co-ordinating role in the administration of the North that there will be a balanced development North of 60. So going back to Ottawa we really get the impression that now the people, those who represent different elements in northern development, are willing to sit together to discuss the issues, to look into the problems and to come up with some acceptable policies to all the segments that will form the great North. That will be probably Canada's greatest achievement in the 70s.

But as I said to you I am not the guest speaker tonight, I'm just the maître de cérémonies I'm the M.C., and I have a

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very pleasant task to do now. I would like to introduce a colleague of mine, the Minister of Transport, Don Jamieson. Of all the newcomers that came into the Cabinet after me and Mr. Trudeau, - because I got appointed the same day as Mr. Trudeau - the one who came big and strong and who is certainly the best asset we have in the newcomers to the Cabinet is Don Jamieson.

He is a very able man who argues well, who is really concerned to try to be modern but to have his two feet on the ground at the same time. The problem we have in public administration is to make judgments, keeping in mind all aspects of problems. I must tell you that Don Jamieson is the kind of man who has a lot of idealism and at the same time a lot of practicability and I do think that he is one of the best cabinet ministers. I am very proud to have the opportunity to serve with him in the Cabinet and I know that his preoccupation with transport policies and the administration of this big department are very well received by the public and very efficient. I know that you are very keen to listen to him tonight.

Ladies and Gentlemen, it gives me a great pleasure to introduce to you my colleague, the Honorable Don Jamieson, Minister of Transport for Canada.

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MINISTER OF TRANSPORT

It certainly has been a pleasant experience to be here at this Conference. I wish there was time for me to exchange with you some more of the humorous anecdotes and the like that I've heard, ever since I've been here; because, apart altogether from the value that I think has come out of these discussions, there has been a good deal of camaraderie. I think we have had an opportunity to get to know each other better, and I know that Mr. Chrétien and I and the officials from both of our departments genuinely feel, whatever your reaction has been to the Conference, that it's been worthwhile for us and that from now on when we sit down to talk about the problems of transportation in Northern Canada that it won't be just some kind of an abstract but that we will have this confidence that we at least have a small personal awareness of what it is that we are seeking to do.

It's rather difficult to try to summarize our reactions and views of the past two days. There is, I think, a similarity in many respects, not only between my native Province and the North, but also between many other parts of Canada south of '60 and the North as well. I am inclined to think with the gentleman who spoke yesterday morning, that really the 60th Parallel is a rather imaginary kind of line and that essentially our problem in Canada whether it's in the North or in the East or the West, wherever it happens to be, is one of distance. It still is one of geography. I do wish that more of you could have the opportunity to see different parts of Canada.

I am impressed by the fact that there is a commonality to our problems. Many have a little better emphasis, or a little different emphasis, in the North than perhaps they have in eastern Canada, but the same comments are heard with regard to the high cost of living and the contribution that transportation makes to that. Last Saturday night in Nova Scotia and in Saskatchewan only a week or so ago I heard representations, rather difficult to refute incidentally, as to why a carload of steel destined for some point in Saskatchewan costs more to deliver than the same quantity of steel moving on the coast of Vancouver.

And so, throughout Canada in fact, one finds these disparities which are really part and parcel of the geographic problem and which it is exceedingly difficult, I think, for governments or for anyone else to level out in a meaningful way. For example, let me just comment briefly about some suggestions that were made during this Conference about forms of subsidization. I am not in a sense congenitally opposed to subsidies, and I believe that in many respects the overall contribution that governments have made in the North and elsewhere, are in reality a form of subsidy; but after a great many years of the Maritime Freight Rates Assistance Act and various tinkering and meddlings that have gone on with that particular scheme, which many regard as the "magna carta" of Atlantic Canada, after all of these efforts, the truth of the matter is that the subsidy route has not brought about the desired results. I think that one can cite example

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after example throughout Canada which illustrate that although this appears on the surface to be the simplest and the most direct route to helping people, it really does very little in the long run to even out the hills and the valleys, as it were, of the cost of living or generally the cost of doing business in one part of Canada as opposed to another.

So I simply say to you, that while in the last analysis there may be occasions where there is no alternative but to provide some form of direct assistance, this really is not the hard core of the problem. If it were that easy, then most of us here would not be applying ourselves as we have been up to now, and as we will, I am sure, continue to apply ourselves to more meaningful and lasting solutions.

I don't believe that it is possible to try to assess this Conference without becoming a bit philosophical, and I might say at the outset of these remarks, that I apologize if now I begin to sound like the instant expert: I don't want to give that impression but I do have a very vivid impression out of these last two days that the problems here in Northern Canada, in the Arctic, really divide in a sense down a rather clear-cut line. There are the problems of people: not merely the native people but all of the residents of the area. There are the problems of small communities and the residents of these communities, and these problems would exist whether we had development in the North or not. There would still be the challenge of how one gets a dozen

eggs into Cambridge Bay or into some other remote location at a reasonable price.

That it seems to me, is one part of the challenge, one of the difficulties: how to, in a sense, shrink the distances so that you give to people who live in the North, as we are seeking to give to people who live on the periphery of all of our country, some measure of equality with those who are more fortunate in one sense and who live in the central regions right at the heart of things in places such as Montreal and Toronto. And so we have, if it's not jargon, a kind of "people problem" in the Arctic when one relates it to transportation.

Secondly, we have what I call the developmental problem: this is the result of all manner of interests by all manner of people, many of them represented in this room tonight. Imaginative people, in many respects creative people, who are reaching out, seeking to determine how best to extract the known and suggested or hinted-at wealth that exists within this vast area. And here we have in a way, a different kind of problem. Because the initiative, as I mentioned yesterday morning in a different context, only rests with government up to a point. Others are going out and searching out in particular regions of the Arctic, determining whether there is a potential for gas or oil or minerals or whatever the case might be, and then by their actions taken in many respects unilaterally, putting a demand upon government, seeking a response from government, in order to fulfill the needs that

have been created by their initiative in the first place.

Now these are not wholly separate problems by any manner or means. There is a crossover and I think the interesting point, and perhaps the most important point - when one tends to downgrade the importance of development in the North - is that those people in this area who are being badly served at the moment, are those who happen to be in the path of or at the location of development. In other words, if we didn't have the development -- if we didn't have the vast array of interests, a whole variety of interests represented in this room tonight -- then the odds are that not only would we be worried about the small community that still doesn't have adequate air service but the chances are we'd be worried about the kind of service that was existing in Yellowknife or in Inuvik or in any other of the growth centres because these have come about, as the progress in the North has occurred, primarily because there have been people with vision, even inquisitive people, even people with a wholly subjective interest in simply, as Mr. Chrétien has said "extracting what they can out of the area". But even these have had, in a sense, a beneficial effect, because they have brought enormous benefits to the residents of the whole region.

Now, in trying to resolve this question, in trying to ask ourselves what the real nature of the challenge is, I got the impression over the past couple of days that it's one of balance, that really, we can't turn our back on development. I

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don't think that it is appropriate for the Canadian Government or for Mr. Chrétien or myself to simply say that we are going to keep this land in all its beauty, unadorned by any form of economic development or industrialization. I don't believe that it's right or proper for us to take that route even if we had the power to do so. But at the same time, I concur totally in his view that in fact we can't simply sit back and allow the North to be raped as so many other parts of our country have been in the past.

I mentioned being in Nova Scotia recently and when one travels about Cape Breton Island or moves over into my own Province, to a place like Bell Island -- or some of these other mining communities that had their roots back 75 or 80 years ago -- you have to be appalled at the incredible shortsightedness of private enterprise, you have to be literally angry at the way in which they wrenched everything of value that was there and then when the day came that it was no longer of value, turned their backs on it, left a brutalized country and at the same time left large numbers of people with nowhere to turn -- people in their middle years for whom they disregarded all sense of responsibility. And invariably when those things have happened in the last 50 to 75 years, it has always been governments at one level or another that have had to come in and try to the best of their ability to clean up the mess.

Now two things have happened I think, since those kinds of development started and since those ends resulted. First of

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all, governments have become more enlightened. I believe that today you would be inclined to agree with us that we haven't gone too far -- that indeed perhaps we haven't gone far enough -- in saying development 'yes' but not development at any price; that, in fact, we have to ensure that if industry and business is going to extract the known wealth of this vast area or of any part of Canada, there is a price that they must pay for that, and that it is they who must pay and not the country, not the countryside and not the people who are common to that area. And so we have now more stringent and more reasonable rules. I believe it was one of the best things that has happened in many years in Canada when this Government decided six or eight months ago to go even beyond the normal conventions of international understanding and to introduce the Arctic Pollution Bill.

I have heard certain people at this Conference talk to me about the severity of these measures and also about the severity of the measures which I introduced recently under the Canada Shipping Act. Of course it's inevitable -- and I would do the same thing if I was in their place -- that they should feel we are asking too much, but I say that there is not too much that we can ask, that it's too late if we have two or three more Chedabucto Bays along the east or the west coast of this country; it is not too much when there is the prospect of a two hundred and fifty or three hundred thousand dead-weight-ton tanker collapsing in the middle of the Arctic Sea or on the west coast

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of this country. These are new threats to our environment, they are new dangers, and the government would be totally irresponsible if it didn't say that it's going to take the toughest measures possible. And I say to you as businessmen and as industrialists, that if you can't live with this kind of rules, then get out of the game. Because this is the way it's going to be and this is the way it's going to continue to be for as long, at least, as men like Mr. Chrétien and I have any responsibility.

Having said that, and having emphasized my belief -- and I am sure it is shared by my colleagues -- in the necessity for development in the North, we come to the basic question which has run through many of our discussions over the last two or three days, and that is the degree of sharing between the public and the private sector. To me it is incredible to even suggest -- and I hope we have never been misinterpreted as a Ministry of Transport in talking about 'user charges' that we would expect that every single facility in the North had to pay for itself from day-one before we would be prepared to put it in. Believe me I have had enough experience with slide rule boys, I have had enough experience with the so-called economic consultants and I have had enough basic business experience myself to know that in 'the chicken and egg game' it's the government in the first instance that has got to lay the golden egg. Unfortunately there are too many occasions when we get strung

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up by the neck as a rather badly plucked chicken. But apart from that, I do believe that there is a responsibility on us to provide the basic infrastructure, to provide the basic facilities, to lay the ground work so that enterprisers of one kind and another can move in and spend their own dollars. What is very unclear in my mind however -- and I suggest that we all ought to talk about this more -- is, first of all, the sharing of costs in the first instance, and, secondly -- and perhaps even more importantly -- the sharing of rewards in the second instance.

Too often in the past there have been attitudes which stated simply, that if someone came in and found a mine or an oil well, that by some strange chemistry all of us should get down on the ground, bow our knees, saalam a half a dozen times and hail them as the great free enterprise heroes of all time, despite the fact that perhaps having done all that, the demand on the public sector might be for four hundred miles of railroad, or for six or seven airports, or for seven or eight hundred houses, or for schools and other infrastructure. In other words, "I've got the mine fellows, bring it all to me and look at me... I'm the greatest hero".

Now I say to you that such developments just don't make any sense any more; in some way or other we have to equate the importance and the value of the so-called infrastructure to be applied by the government, to be put in by the government, to the

ultimate returns. In other words, if we're going to share the risks with you fellows then let us get a piece of the action at the end of the line. So I hope that we can devise a practical scheme and of course it won't involve only my Department, but it will also involve Mr. Chrétien's, perhaps primarily. May I say, by the way, that one good turn perhaps deserves another and when politicians start to compliment each other most people generally get suspicious -- but at the same time I do want to say in your presence that I have been enormously impressed over the past two and half years not only with Jean Chrétien's skill but with the sense of awareness that he has, with the anxiety that he has to learn, and with the enthusiasm that he is bringing to this extremely difficult job. I would say that when one puts together Indian Affairs and Northern Development, puts in your lap forty percent of the land mass of Canada and says "Here, work it out" ... that's a job that I wouldn't want on a bet. And I want to pay tribute to him here tonight and say that I think that you who work in the North are singularly fortunate to have a Minister who is young, aggressive, creative and who has as his motto, I believe "No Sacred Cows." Jean, I'm happy to say this to you tonight.

Now to get down to some basic points. Yesterday I started by talking about the divisions within the Department of Transport and perhaps the best way for me to try at least to get some order out of what I have been saying, is to deal with the

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Air, Surface, and Marine Administrations in the context of what's been discussed at this Conference.

Dealing with Marine first of all. I think that there was some kind of a misapprehension unwittingly generated during some of the discussions, to the effect that at the present time we don't have an ice-breaker-building capacity in Canada. This of course is not so. In fact we have already built a number of ice-breakers, the most recent of which was in Hudson's Bay no further away than three or four days ago, the St. Laurent. The John A. Macdonald which was the ice-breaker that navigated the Northwest Passage along with the Manhattan, was also a Canadian-built ship. In fact all of our Canadian ice-breakers have been built in this country. Most of them have been multi-purpose ships, generally speaking. We have not, up until fairly recent times, had that same urgency about Arctic developments that we have now experienced; so generally speaking most of our ice-breakers were designed to not only break ice in the St. Lawrence and on our east coast during the winter months, or to do various forms of Arctic re-supply during the summer months and the like, but they have also served double duty in terms of being special supply vessels for aids to navigation and for a number of other reasons including in one case in fact cable laying. And so we have really tried, and I think quite successfully up to now, to devise vessels that could serve the wide range of needs that are required of us.

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We now reach the point -- and it was highlighted by the Manhattan -- and I touched on this yesterday, as to what kind of ship design we now want to have in terms of new developments in the Arctic. Now there are those who say that we should go in for what I might describe as the purest form: an Arctic ice-breaker. That is a vessel that has only one purpose, which is simply a large thrusting prow, in effect, with all the power that you can possibly put inside of it and just use it for that single purpose. But at the present time -- and as I believe our Conference showed -- there is certainly no unanimity of opinion as to whether or not in the foreseeable future we are likely to be attempting, let alone succeeding, in running a regular or a kind of scheduled route service all the way through the Northwest Passage. So therefore, if one is going to have a more limited objective in terms of ice-breaking, if it is going to be confined, let us say in part at least, to the Eastern Arctic into Hudson's Bay up into Baffin Island where the known sources of minerals are at the moment, then it is conceivable that you don't need the same kind of vessel you would need if you were going to go all the way through the Northwest Passage and seek to do it on a regular and scheduled basis.

Furthermore, I think if the Manhattan voyage proved anything -- and I believe that it was a very useful exercise -- it also showed that, in fact, for shipping to be effective in the North one has to build the kind of vessel that doesn't need

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ongoing and continuous icebreaking support in terms of an escort vessel because in effect what you would be doing in that case, would be running two ships for the sake of one. And so what is really necessary in terms of northern transportation, if we're going to move into this business of bulk carriers for minerals and perhaps other products, is that these vessels themselves have to be designed as icebreakers -- they have to be ice strengthened vessels that can function on their own in this environment rather than have to have continuing support. I'm not suggesting that we should or can eliminate the necessity of ice-breakers for assistance purposes, to keep channels open and that kind of thing, but basically it seems to me that perhaps the main part of the problem is the design of a successful and efficient ice-strengthened vessel that can generally speaking operate safely and effectively more or less on its own.

And so, when there is criticism, as there has been, about our failure to place contracts for the design of an ice-breaker for polar work, it is simply because, as this Conference I believe confirmed, there continues to be a good deal of uncertainty in various quarters as to just what the appropriate task ought to be. And rather perhaps than to now move to a design stage for a specific vessel, our money might very well be better spent -- and frankly this is the direction in which I am moving at the moment -- on a study in general terms of the kind of vessels that we are going to need to operate successfully in

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the North. But there can be no doubt and no question about our enthusiasm for this particular project. I look forward to the day, and I don't believe that it is all that far in the future, when in fact we will consider navigation of much of our Arctic Seas as routinely in many respects as we now consider navigating south of '60.

Now there are several other matters in marine that I just want to touch on briefly. There is of course the whole question of the future of the Northern Transportation Company and the Mackenzie Route in general. I have been, ever since I was here this summer with Bill Gilchrist, very impressed not only by his knowledge of the North and of the River, but also by his enthusiasm for this unique waterway. I would question if there is one Canadian in perhaps a hundred or one hundred and fifty thousand who has the slightest awareness that the Mackenzie River even exists, and yet here we have one of the great waterways of the world. What a fantastic asset for us to possess, particularly now when we are seeing so many developments which are basic and which are so necessary in terms of the kind of transportation that the Mackenzie provides! But here once again the problem of government is one of options. The questions that are raised are whether or not we should in fact expend large sums of money to improve the waterway as was mentioned yesterday; or whether we should in fact now seek some other means and of course as this Conference made very clear, there is no unanimity

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of opinion in regard to the use of the Mackenzie as opposed to a road system or a railroad or to new and advanced methods of aviation and so on. My own personal judgement if one can have a tentative conclusion -- I'm not sure that that isn't a contradiction in terms -- but I have reached the conclusion, tentatively at least, that the Mackenzie will continue, for a very long time to come, to be an essential part of the transportation complex of Canada.

For my part I believe that we have to work in that direction. Whether or not it is necessary for us to undertake in a rapid sequence a major change or whether it can be phased as the growth occurs, I am not certain. But the studies are going on now as many of you will know, and I know too that Bill Gilchrist won't let me get a minute behind the information as soon as it comes to him. I was very excited last summer when I had the opportunity to travel on the Mackenzie and I am hoping that this coming year I will have the chance to make the trip all the way from Hay River right out to Tuk because as I said many times during these last couple of days, publicly and privately, there is a certain amount of romanticism in this whole business of northern development and what could be more romantic than to be a kind of northern "Huck Finn" in the 1970's moving on this river as on the Mississippi so long ago.

Now I could range over many other problems in the marine area of transportation but I merely want to touch on one more

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in the interests of saving time, and that is the question of insurance. Dr. Camu and I, along with Alan Baker who is my Special Advisor on these matters, were in London just about ten days ago and Dr. Camu and Mr. Baker at that time initiated talks with the underwriters with a view to getting a more realistic approach to the whole question of marine insurance. It seems to me at the moment, to be brutally frank about it, that the underwriters put the rates together with a ouija board because that's the only justification that I can find for some of the formulas that seemed to come out. And I have the personal impression that there is a lack of awareness first of all on the part of the insurance people, as to just what is involved here. And like a lot of other people I expect they have a conception of the North that is as erroneous as mine was up until comparatively recent years; and so it is my proposal that we will invite a representative group from the insurance community to come to Canada for first-hand talks here and I will also arrange to have them see the ground for themselves and to see the conditions for themselves in the hope that once they have recognized the reality as opposed to the fiction on which they now seem to operate, that we will come up with a better deal. Whether or not it is advisable or whether or not it is possible to introduce some measure of competition into this, I am not sure but I certainly hope that we can get more information on the subject and I was most pleased with the splendid and forthright manner in

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which this problem was dealt with yesterday and I hope that we can go on with these discussions. Now as I said, I have to leave Marine at this point because if I don't the speech will be even longer than Mr. Chrétien originally forecast.

Now dealing with Surface Transportation. There isn't a great deal that one can say about it. I think it's fair to say that probably there was more contention during this Conference about the future of various forms of air cushion vehicles than about almost any other matter. There appears to be a wide difference of opinion as to the magnitude of the role which this type of vehicle is likely to play in future northern development. Frankly, I of course am not sufficiently expert to be able to decide on one side or the other of this issue. I do have this kind of futuristic view that something as imaginative as that surely ought to be able to be adapted in one way or another and for one purpose or another in terms of northern transportation. Theoretically and ideally it would seem to be the answer for a great many things, when one thinks of the vastness of the space, the lack of proper rights of way for various and more conventional modes, but again I believe that much more research is needed; for our part we want to participate in this research and we will cooperate with various other agencies including the armed forces who are doing so.

Road construction I touched on in my opening remarks yesterday and there isn't a great deal more that I can add. It

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does seem to me once again that we have to throw out a great deal of the technology - a great deal of the experience that we have learned in the southern parts of this country, and that we have to take a quite different approach in terms of road construction in the North. I was pleased last night to sit with Mr. Soucy of Université Laval and we discussed it at considerable length and of course we both came to a conclusion that is probably old hat to most of you, that in view of the relatively long winter season here where you can make these winter roads comparatively inexpensively, that there may be some kind of technology, special technology, that can be devised which will enable us to create a whole new approach to road construction in the North.

Railways: a subject on which I could dwell for many many hours, because we are looking now at the possibilities of routes up through for example, the northern part of British Columbia into the Yukon and perhaps then spanning out from there to the east into parts of the Northwest Territories. A fantastic vision! Today Sandy Morrison in what I thought was an excellent paper, talked about the effect of the original railroad and the compact of Sir John A. Macdonald with British Columbia. What we are talking about here is in many respects today even more bold and visionary than even that idea was 100 years ago. And it's incidentally probably going to cost even more money than did the route clear across Canada. But here again it has to be looked at.

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The terrible frustration that one finds in a planning role such as I happen to occupy at the moment, is this necessity on the one hand to get on with the job and yet always to have so many questions unanswered. Because you say, 'let's build a railroad up into the Yukon'; then somebody says, 'hold on a minute, which route should it be'? And so you're back to the necessity to ask more questions because otherwise you might wind up making the greatest mistake of all. And yet if you always insist on making further studies - if everything that is raised suddenly involves you in more data accumulation, then of course you don't move at all.

So there is a necessity today in government perhaps more than at any time in the past, on the one hand to be initiating, to be creative, to give leadership; on the other hand to be responsive to known and established needs. This is perhaps the biggest single problem that we have in planning for the North. But the railway concept is not being lost sight of, any more than is the idea of perhaps this transportation corridor down the Mackenzie.

I think we have learned over the past two or three days that we're not talking here about a corridor that is specific in terms of its width all the way from one end to the other, that there may be all kinds of variations. This is a semantics problem that often occurs when people start talking big talk and dreaming big dreams; but nevertheless the idea that at

some point throughout this vast territory we can create in a relatively confined area, a communications route - perhaps a railroad, perhaps a road, pipelines - various other facilities all close together, all creating a tremendous opening up effect for northern Canada, is one to excite I think even the dourest of men and this too is something that I suspect will come much more rapidly if in fact as now looks likely, we get the gas and oil developments that Mr. Chrétien's Department and Panarctic Oil and various other agencies are involved in. Who can say how this is going to turn out?

Reporters sometimes say to me as they did today, "well what's the policy for the North"? as if somehow or other like Moses of old I'd suddenly emerge on a cloud with two tablets of stone and that would be it for all time and to the end of the world. Well of course anybody here tonight knows that this is an evolving kind of process and that we have to anticipate as best we can; but we also must be ready for the unanticipated. So in Surface Transportation as I say, these are just some of the things on which we are working.

Finally in Air. And this is perhaps in many respects the most immediate of the concerns, the most difficult of the problems. On the one hand I think it is fair to say that air services are developed in the North for two reasons: Primarily because of a response to established an known need but also because there were men of daring, men of vision, men

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who were willing to risk not only what fortunes they had but also their lives in order to open up the country. So there is a great, what one might describe as free enterprise tradition in terms of air transport in the North. We've heard about all the pioneers and the like who flew by the seats of their pants, who did all sorts of weird and wonderful and thoroughly admirable things in the North. And so therefore I think it is quite natural and understandable that these people should now at this stage, should in a sense grate at the amount of restraint against which they find themselves fighting from time to time. I congenitally am opposed to regulations. I wasn't in private broadcasting for damn near twenty years without knowing what it was like to have to work under a regulatory authority. But I also say to the air boys here that I think that they're just as good at beating those regulations as I was for twenty years or more. So therefore I don't particularly lose any sleep about how they're going to function in a sense. Nevertheless, I want to say tonight that one of the things that I think is quite important -- and I was impressed by the arguments in many quarters during this Conference -- is that we have not in fact evolved what I might describe as a northern aviation policy. It is a fact, and I think a defensible fact, that it was logical at the time that northern policy became more or less an appendage to regional air policy. And there is no doubt either that there is a relationship between the two and they can't be divorced

any more than regional policy can be divorced from what I might describe as mainline policy. But I believe the time has come for the policy makers, who after all are within the Ministry of Transport, to seek to evolve a sensible and specific northern policy. One that recognizes first of all the importance of aviation in the North, and secondly that also recognizes that there are conditions that exist in this country that don't exist elsewhere and that perhaps we have to approach things in a different way above '60. Now I'm not going to suggest for a moment that this will result in a new kind of laissez-faire aviation policy. I don't believe that the more sensible amongst you, and that includes virtually everyone, would want to go back to the cut-throat days when it was 'dog-eat-dog'.

I was interested to see this afternoon, five competitors on the stage all complimenting each other and all loving each other dearly, and I couldn't help but realize there's nothing that brings people together - even enemies closer - than having a common person to hate. I would have been delighted had there been time this afternoon to sort of turn the tables a little bit and to just see how any one of those gentlemen on the platform would have devised air policy if it was his responsibility to do so. And I have a few suspicions as to how it might turn out depending upon who got the assignment. But nevertheless, I do say that regulation is necessary. It's necessary from a safety point of view - it's necessary I think to ensure that

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we don't get an overexpansion which in that field is probably as detrimental in the long run as a lack of expansion. But it does need a new look and I undertake tonight to see that this is done forthwith.

The second matter with regard to air that I should comment on is the matter of aids to navigation. Here once again I was impressed by the arguments that were put forward. I think that most would agree that the Ministry of Transport has moved ahead very rapidly. Many of you were kind enough to make reference to Mr. MacDowell and others and to the work they have done in the Arctic and I think that those words were well deserved. When one considers the demands that have been placed on us over a three or four or five year period, the growth that we saw in the charts that were presented today, I think a reasonable person would have to concede that it hasn't been a lack of responsiveness - it has been a case of growth and the expansion taking place so fast that it's virtually impossible for us to keep up. And you know, trying to set down a good navigational pattern across the North is difficult when one sees the enormous distances with which we are dealing, we might very well be going in one direction only to find when we're half way there that a development has occurred somewhere else or there is a requirement somewhere else and we are off base. Then the pressure goes on for us to take care of that particular route. So I do say in defence of our position that it isn't one of neglect. I think

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it is simply one of just too rapid development for technology to keep pace with. But since it is going ahead so fast it does require a special emphasis on our part and I undertake to see if it is feasible at all to speed up beyond our normal planning what we will do and also to try and employ some of the new methods that were heard about at this Conference which were most informative to me and which I hope will resolve the problem at least in part.

One final point on aviation is of course the matter of airstrips. Here once again I can understand the impatience and the irritation of those who see their own particular and thoroughly understandable ambitions thwarted in some way or other by an inadequacy of airport facilities. But again I think I have to remind you that if one thinks back to five or six years ago even, and realizes what the state of play was then in the North, in terms of paved strips, in terms of instrument landing systems, in terms of a whole range of facilities, again I think it has to be conceded that we have moved ahead quite rapidly. I was amazed myself during this past summer when I flew around the Arctic in a jet aircraft and discovered the number of locations at which I was able to land with ease and which were able to accommodate jets. Now I know that there are other developments coming along that will also need facilities. But here it's not only a problem of money - although that is terribly important - it's a problem as I have mentioned repeat-

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edly at this occasion and others, of trying to determine what the future needs are going to be. Not merely in terms of demand created by developments but also how these are going to be affected by new types of aircraft. I don't think personally that STOL will come into a really prominent role in the 70's in the North, although I do want to undertake a couple of experimental operations in this area -- in a sense some of the things that are already going on, but things that we can look at from an experimental point of view to see how they function. But here once again we will undertake a review of our aviation policy in terms of airports. Mr. Chrétien's Department is doing much already.

When we talk about the lack of facilities, of course it really is a lack of so-called up-to-date facilities because most places now have been provided with at least an unsophisticated strip, and many as I said are up to the point in many locations where they can accommodate 737's. Should we go to the point in many locations where we're up to 707's or DC8's? I'm not sure. We have to consult I think with the people concerned and while I am not wedded to the 'user pay' concept or the chicken and egg as I mentioned earlier, what we would really like to see is some hard evidence that we won't wind up with a situation where we have overbuilt prematurely and find out that it isn't being utilized as much as was forecast. I know that you have to separate the buying talk from the selling talk and you

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always have to discount a little what people tell you about what the prospects are. This doesn't mean that they're over-enthusiastic. It really means that they put the best side on things. But the more hard evidence that we can accumulate the better; that says that in fact if there was a longer strip or better facilities at such and such a location, there would be a greater utilization. When we have hard evidence I am not afraid then to take some chances. I'm not afraid to argue that we ought to put the financing into that kind of a project because its going to pay off sooner or later. So I invite the business community in aviation in the North - those who are engaged in shipping and the like - all of them to help us in this regard.

Finally, I hope that when we set up the Arctic Transportation Agency we will have, as was suggested again today, and I'm prepared to accept this proposal, an Advisory Board for the Arctic Transportation Agency that will be made up not only of representatives of Mr. Chrétien's Department and my own, but also of both the aviation interests and the other transportation interests and of the users as well. We have a good deal to learn. The last thing that I would want to suggest is that we are the repositories of all truth and knowledge in the Department. We can use a lot of guidance and I don't think that you will find us in a sense negative at all as long as we can see a reasonable defence for these very heavy expenditures of public moneys. At the present time, despite the comment about the lack of

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facilities here and there, our Department is spending in the North some \$35 or \$40 million annually. Per capita, if one were to apply that yardstick, it's clearly the biggest in the country but I agree with those who maintain that this is not a defensible position to take. But by any yardstick it's still a fair amount of dollars and of course it doesn't include many capital works of one kind and another that we're undertaking as well.

And so I say that I don't believe that the area is being neglected. May I just end by saying to you that in my own riding of Burin Burgeo on the south coast of Newfoundland there are people who are every bit as isolated - every bit as cut off from services - as are the remotest people living in the North. Not two years ago when I was campaigning or just about two years ago, I went into a little place on the south coast of Newfoundland where a young fellow was dying of blood poisoning with no way to get out to hospital off this remote island. And it so happened that I flew in there and was able to take him to the hospital. So I just mentioned this to say that this is not the only part of the country where in fact we haven't yet broken through to the point where everybody accepts the amenities of the 1970's as a matter of course. The challenge to the Department of Transport is not merely above '60. That's a special challenge - a special kind of excitement but it applies all across the country. And I think I have to say too that north of '60 won't survive

without south of '60 any more than the other way around. In other words it's all one country, and what we are concerned with is a total transportation complex. You have helped immeasurably during this Conference to give us the kind of guidance, the kind of suggestions we have needed.

Although I have gone far longer than I should have, and far longer than even Mr. Chrétien forecast, I felt that I owed it to you to give you some response to what you have done during the past two days. Forty-five or forty-six of you went to a tremendous amount of trouble to prepare papers. We are very grateful to you. I understand that some who prepared papers travelled extensively themselves in order to get the information to go into them. In addition to that forty-five, some 200 others have come here from all across Canada and from the United States. It's been a unique and challenging opportunity. I don't say to you that as of tomorrow everything is going to be alright with transportation in the North. But you have a Minister of Transport who knows more about it than he did yesterday morning. You have a great many officials who are also better informed and more than that, I think we also have a situation where we have a better understanding of each other and we have that kind of shared concern and shared enthusiasm that I can't help but feel is going to pay off in better things, not only for the Arctic but for Canada generally. You've been very patient. My thanks to you all.

APPENDIX "A"

BIOGRAPHICAL SKETCHES
OF
PANELISTS AND CONTRIBUTORS

R.F. Allan, President of Robert Allan Ltd., naval architects, Vancouver. After spending the war years in charge of naval refits and major conversions at Burrard Dry Dock in North Vancouver, he joined in partnership with his father in 1947. Together they designed many well-known vessels and pioneered many innovations in B.C. commercial craft. In recent years the firm has done pioneering work in marine technology, particularly in the field of tugs and barges.

Ray W. Anderson, General Manager, Mid-Arctic Transportation Co. Ltd., Inuvik, N.W.T. Born and educated in Saskatchewan, he worked in a mine in northern Manitoba, spent two years surveying in British Columbia, and two years in a contracting partnership in Saskatchewan before joining Mid-Arctic Transportation in 1969. As general manager he has travelled widely through the western Arctic, the Yukon and Alaska. He is president of the Inuvik and District Chamber of Commerce.

K.J. (Ken) Baker has been Director of the Yukon Territory's Department of Public Works for a number of years. An engineer, Mr. Baker first went to the Yukon as an officer of the Canadian Army when the Canadian Corps of Engineers was responsible for the operation of the Canadian portion of the Alaska Highway. Upon retiring from the Army Mr. Baker joined the Yukon Public Service.

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John N. Ballinger, Associate Director, Marine Works, Ministry of Transport. A civil engineer, he graduated from the University of Toronto after serving overseas as a squadron leader in the RCAF during the Second World War. After three years in the construction of Toronto's subway, he joined the Aids to Navigation Division of the Department of Transport in 1953. He was district engineer in the Dartmouth marine agency 1958-60; district marine agent 1960-62; Chief, Canals Division, Ottawa, 1962-65; and Chief, Aids to Navigation, 1965-69.

Maurice Baribeau, Quebec Regional Director, Air Services, Ministry of Transport. Born and educated in Quebec, he began his government career with the Dominion Bureau of Statistics in 1931, left in 1940 to enlist in the RCAF, served overseas as a pilot, and was chief flying instructor with the Ottawa Flying Club before joining the Department of Transport in 1948 as a civil aviation inspector. He became Superintendent of Regulations and Licensing in 1956, acting Regional Controller of Civil Aviation in 1963, and was appointed to his present position in 1965.

Gordon Bartsch, President, Great Northern Airways Ltd. A former co-pilot on domestic and overseas commercial flights, he started his own company in 1963 with one rented plane. In 1965, it merged with Connelly-Dawson, in which he had bought an interest, and when

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Yukon Flying Service was absorbed, Great Northern Airways was the result. It now has 16 aircraft and a staff of more than 100. He started his flying career as a hangar attendant in Calgary, took flying lessons, and upon receiving his commercial licence, joined Mannix as a co-pilot. He joined Canadian Pacific Airlines in 1955.

F. W. Benum, Chief, Forecast Division, Canadian Meteorological Service, Ministry of Transport. A B.A. graduate from the University of Manitoba, with an M.A. in meteorology from the University of Toronto, he has been in the meteorological service for more than 30 years. He was a weather observer in 1937-38; a meteorologist-forecaster, 1939-48; superintendent, Continental Aviation Weather Services 1948-58; and was appointed to his present position in 1958.

G.C. Butler, Director, Division of Biology, National Research Council. A Ph.D. in biochemistry from the University of Toronto, he was a chemist with a pharmaceutical company before joining the Canadian Army in 1942. He served with the Chemical Warfare Laboratory, retiring with the rank of major. He worked on the National Research Council's atomic energy project from 1945-47, and was professor of biochemistry at the University of Toronto from 1947-57. He served as Director, Biology and Health Physics Division, Atomic Energy of Canada Limited from 1957-65; and from

1965-68 was Director, Division of Radiation Biology, NRC.

N. E. Carpentier, Vice-President, Director General Industrial Division Bombardier Ltd. Educated in French at Collège des Jesuites, Quebec and in English at University of Western Ontario from where he graduated in 1964 in business administration. Held various positions at T. Eaton Co. Ltd. Montreal; joined M. Pollack Ltd. May 1965 holding positions from Assistant Merchandise Controller to Assistant to the President. Joined Bombardier Limited Valcourt in 1967 as Assistant to Vice-President of Marketing; performed various research and operational duties for Industrial and Recreational Division; special projects assistant to the president; later Director of Marketing, Industrial Division.

Hon. Jean Chrétien, Minister of Indian Affairs and Northern Development. Born and educated in Quebec, he is a law graduate of Laval University. After being called to the bar in 1958, he entered the Shawinigan law firm of Lafond, Chrétien, Landry and Deschênes. He was elected to the House of Commons in 1963, and re-elected in 1965 and 1968. As a private member he was parliamentary secretary to the Prime Minister, later to the Minister of Finance. In April 1967 he was appointed Minister Without Portfolio, and in January 1968 he became Minister of National Revenue. He was named to his present position in July 1968.

William W. Collins, Senior Railway Economist, Canadian Surface Transportation Administration, Ministry of Transport. A 1959

honours graduate of Williams College in the U.S., he began his business career with the Proctor & Gamble Company in marketing and product management assignments. He was Manager, Corporate Planning, for the Baltimore & Ohio/Chesapeake & Ohio Railways in Baltimore, Md., before coming to Canada. He joined the Ministry in 1969, serving at first with the Transportation Policy and Research Group.

I. C. Cornblat, Assistant Deputy Minister, Finance, Ministry of Transport. Born and educated in Ottawa, he enlisted in the RCAF in 1937 and held the rank of Air Vice Marshal when he resigned in 1963. His appointments included Assistant Chief of Staff, Administration, in NATO; Chief of Materiel, RCAF; Comptroller of the RCAF; and member of the Air Council. After his military career, he went to Europe as vice-president, European Operations, for the Canadair Division of General Dynamics Corporation, and later was named assistant to the President of Canadair in Montreal.

J.L. Courtney, Research Economist, Canadian Transport Commission. A 1969 M.A. graduate of the University of Waterloo, he was research assistant, long range planning group, National Capital Commission in 1967-68, and at the same time was a teaching assistant in the geography department at Carleton University. In 1968-69 he was a teaching and research assistant in the geography department at the University of Waterloo. As research economist, he was project

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director of a survey of air traffic in the Northwest Territories and the Yukon during 1968-69.

V. R. Cox, Saskatchewan Area Manager, Canadian National Railways. A graduate civil engineer from the University of Alberta, he was named location engineer in Winnipeg in 1951, and has been actively involved in construction of CN development lines. He was in charge of location and construction of the 435-mile Great Slave Lake Railway, and the 235-mile Alberta Resources Railway, for example, and was location and project engineer for CN's Toronto terminal project. He was appointed engineer for location and construction of the CN system in 1962 and was recently named to his present position.

R.G.S. Currie, Vice-President, Land and Administration, Panarctic Oils Ltd. A graduate of the University of British Columbia, he has had 20 years experience in land contracts and administration in the oil industry in Western Canada and abroad.

John B. Denison, Truck/Air Coordinator, Pacific Western Airlines. He has been in northern transportation since 1947 when he went into business with a two-ton truck between Peace River and Hay River. He formed D & S Trucking in 1948 and operated from Edmonton and Peace River to Hay River, connecting with a DC-3 freighter in Hay River to carry out the first truck/air combination

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to Yellowknife. In 1960 he joined Byers Transport Ltd., which was sold to Pacific Western Airlines in 1969. Born and educated in British Columbia, he was in the RCMP before going into the trucking business.

Peter Detmold, Special Assistant, Department of Research, Canadian Pacific. He was previously director of economics and systems analysis with the Canadian Transport Commission. Before coming to Canada in 1968, he was with British Railways and before that, with deHavilland and Hawker Siddeley. Starting his career as an aircraft engineer, he took an extended degree in economics and has been concerned with the use of computers in evaluating major decisions and in long-range planning. He is now undertaking a major strategic study for CP.

R.P. Engle, President and General Manager, Northwest Territorial Airways. A native of Seattle, Wash., he was general sales manager with a paper products company in Seattle before immigrating to Yellowknife in 1957. He served as an officer in the U.S. Naval Reserve during the war, and graduated from Yale in 1950 with a B.Sc. in industrial administration. An experienced pilot, he founded NWT Air in 1961 and still pilots the company aircraft on occasion. The company operates with DC-3 aircraft on its passenger and freight schedules to Arctic settlements.

Dr. W.A. Fuller, chairman, Department of Zoology, University of Alberta. Born in Saskatchewan, he is a graduate of the University of Saskatchewan, (B.A., M.A.) and the University of Wisconsin (Ph.D.). He served with the Canadian Wildlife Service in Fort Smith, NWT, from 1947-56, and in Whitehorse from 1956-59, working on studies of fur bearers and big game. He joined the University of Alberta in 1959 as assistant professor. He established a year-round research station near Hay River, NWT, for studies on population biology and winter ecology of northern mammals.

Captain J.B. Garvie, in charge of Arctic Operations, Federal Commerce and Navigation Company. Born in British Columbia, he is a B.Sc. graduate of the University of British Columbia and holds an Extra Master's Certificate. He was first introduced to the Arctic on the Hudson's Bay Company stern-wheeler trading from Fort Smith, NWT to Aklavik and along the western Arctic coast by Arctic schooner. He is a former captain and assistant operating manager with Saguenay Shipping of Montreal. From 1963-68 he was operating three terminal installations for Federal Commerce and Navigation.

J. Gordon German, Partner, German & Milne, transportation consultants and naval architects. A naval architect, he has supervised designs and studies for 17 ice-breaking ships, and has conducted

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on behalf of the government two major full-scale instrumented trials of Canadian ice-breakers. His company is a member of Northern Associates Registered, a group of experts specializing in the study of Arctic environmental conditions. He took academic degrees up to M.Sc. in naval architecture and marine engineering at M.I.T. and the University of Michigan.

W. M. Gilchrist, President, Eldorado Nuclear Limited and its subsidiaries, Eldorado Aviation Ltd. and Northern Transportation Co. Ltd. A native of Saskatchewan, and graduate of Queen's University with a B.Sc. degree in mining and metallurgy, he has been active in Canadian mining for more than 30 years. From 1941-45 he served overseas as a Staff Captain in the Royal Canadian Engineers. He has been with Eldorado Nuclear Ltd. since 1952, first as assistant manager, then manager of Beaverlodge Operation, later as vice-president of Western operations and vice-president, operations, before taking over the presidency in 1958.

R.S. (Dick) Grout, Manager, Marine Division, Transportation Department, Imperial Oil Limited. Born in Delaware, Ohio, he came to Canada at an early age and is a Canadian citizen. He has a degree in commerce and finance from the University of Toronto. He joined Imperial Oil Limited marketing department in 1951 and transferred to transportation and supply department

in 1965 as coordinator of product supply. Prior to his present appointment in 1968 he was assistant manager, marine division.

Edwin T. Haefele, member of the research staff, Resources for the Future, Inc. A native of Illinois, he was educated at Michigan State University, Illinois Wesleyan University and the University of Chicago. He served in the United States Army from 1943-46 with the rank of T/Sgt. From 1951-54 he was staff assistant, Public Administration Clearing House, Chicago; from 1954-62, director of program, the Transportation Centre, Northwestern University; and from 1962-67, on senior staff, Transport Research Program, The Brookings Institution.

T.A. Harwood, Earth Sciences Division, Defence Research Board, Ottawa. Born in England and educated in Canada, he spent five years in the North with the Hudson's Bay Company following matriculation. A B.A.Sc. graduate of the University of Toronto he served with the RCNVR as a navigation and gunnery officer during the war, then returned to U. of T. to take a M.A.Sc. degree. After five years as manager of a mine in Quebec, he joined the DRB in 1949. His activities include soil, snow and permafrost research, Arctic and military geology and naval scientific interests.

R.A. Hemstock, Regional Arctic Coordinator, Imperial Oil Limited. A University of Alberta graduate with a B.Sc. degree in mining engineering and an M.Sc. in soil mechanics, upon graduation he did research on permafrost at Norman Wells, NWT, for the Arctic Institute of North America. He has served in various positions with Imperial Oil, including district civil engineer in Devon; district engineer in Redwater; and senior research associate in Calgary from 1952-67. One of his major research projects involved the study of muskeg terrain and the evaluation of engineering problems associated with the development of the Arctic.

Stuart M. Hodgson, Commissioner of the Northwest Territories. He was first appointed to the Northwest Territories Council in 1964, became deputy commissioner in 1965, and commissioner in 1967. Born and educated in Vancouver, he served in the Royal Canadian Navy during the war. He became active in the International Woodworkers of America while working with the H.R. MacMillan Company in its B.C. Plywoods division, becoming an international organizer in 1948. Since then he has held numerous offices with the IWA, the Vancouver Labour Council, the B.C. Federation of Labour and the former Canadian Congress of Labour.

Dr. Thomas G. How, Senior Ministry Executive, Ministry of Transport. A native of Saskatchewan, he is a graduate of the University of British Columbia (B.A., M.A.) and Purdue University (Ph.D. in

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nuclear physics). He has been with the Department of Transport since 1938, in the meteorological service, and in various positions in Air Services, becoming Deputy Director in 1967. He is now involved in the development of policies, including those related to Arctic transportation, International Civil Aviation Organization, and the Permanent Joint Board on Defence.

Dr. George Jacobsen, Arctic Consultant, and President, Tower Company (1961) Ltd., an engineering and construction company which has carried out more than 1,000 Arctic and sub-Arctic civil and defence projects. Educated in France, Austria and Switzerland, Dr. Jacobsen has been active in far northern projects since 1930. From 1945-50 he designed and built all Canadian and U.S. weather stations in the high Arctic. He conducts continuous permafrost research; and is chairman and sponsor of the Jacobsen-McGill University Arctic Research Expedition to Axel Heiberg Island.

Hon. Don Jamieson, Minister of Transport. Prior to entering the Federal Cabinet, he was president of the Newfoundland Broadcasting Company Ltd., which operates television and radio stations throughout the province. He is a former director of the Canadian Television Network and was for four years president of the Canadian Association of Broadcasters. Born and educated in St. John's, Nfld. he was first elected to the House of Commons in 1966, and re-elected in 1968. He was appointed Minister of Defence Production in 1968

and Minister of Supply and Services when that department was created in April 1969, moving to Transport in May 1969.

A.F. Joplin, Director, Development Planning, Canadian Pacific. He joined CP in 1947 and was a division engineer before being associated with the development of CP property in Calgary and throughout the West. In 1964, he was appointed manager, special projects, in Vancouver; in 1968, systems manager, planning and development, with headquarters in Montreal; and was named to his present position in 1969. A B.Sc. graduate in civil engineering from the University British Columbia, he served as a pilot in the RCAF during the war.

Ron Kapchinsky, President, Kaps Transport Ltd. He started his own company, Kaps Trucking, with one truck which he drove himself, in 1950. It grew to a sizeable company which he sold in 1957 when he joined Northern White Trucks as sales manager. In 1961 he and two brothers bought back Kaps Trucking and from this grew Kaps Transport Ltd. Raised on a farm in the Edmonton area, he started work on the Leduc, Alberta oilfield in 1947.

T. Alex Kaptý, Managing Director, Trans North Turbo Air Ltd. He entered the aviation industry in 1957 as an accountant with Okanagan Helicopters Ltd. in Vancouver, and in 1960 joined Klondike Helicopters Ltd. of Dawson City. When it was purchased by Foothills Aviation Ltd. of Calgary in 1964, he became manager

of the Whitehorse base, and in 1965 became vice-president of the Klondike-Foothills company. He left to take part in the formation of Trans North Turbo Air Ltd. in 1967.

Radcliffe R. Latimer, Vice-President, Operations, White Pass and Yukon Route. He has been active in the transportation field since 1956 when he was with the CNR as manager, freight sales department, and, later, assistant general manager, freight rates. He was executive assistant to the president of Algoma Central Railway in 1963, and became executive vice-president in 1969. He joined White Pass in Nov. 1969. A B.Sc. graduate of McGill University, with an M.B.A. from Western, he has lectured in marketing at McGill, and was assistant professor, economics, at Algoma College 1968-69.

John D. Leitch, President, Upper Lakes Shipping Ltd. Born in Winnipeg, and educated at Appleby College and Trinity College, University of Toronto, he served in the Royal Canadian Navy as Lieutenant from 1939-45. He is a director of 16 companies, including banking, shipping, insurance, airlines, and manufacturing concerns. He is a governor of York University, and was named Great Lakes Man of the Year in 1964. He has been president of Upper Lakes Shipping since 1952.

Walter J. Manning, Director, Marine Works, Ministry of Transport. Born in Quebec, he is a graduate of the University of Montreal with

a B.A.Sc. degree in construction engineering. He joined the Public Service in 1937 with the Department of Public Works; was appointed district engineer with the Department of Transport, Marine Services at Quebec in 1942; and district marine agent in 1947. In 1953 he became Chief of Aids to Navigation at Ottawa Headquarters, and in 1957 was appointed to his present position. Before joining the Public Service, he was active in various construction projects in Montreal.

B.N. Malott, President, Transworld Shipping Ltd., Montreal. Born in Ontario, he is a commerce graduate of the University of Toronto. He served in the Canadian Armed Forces in Canada and overseas from 1941-46, and subsequently in the Militia (Supply and Transport). He has been engaged in the ocean shipping business since retirement from the active army as a Lieutenant Colonel in 1946. He worked for Federal Commerce and Navigation Co. Ltd. from 1946-59 when he retired as General Manager and set up his own business.

Emmet M. Martin, Traffic Manager, Chimo Shipping Ltd., Montreal. A B.Sc. graduate of Loyola University of Montreal, he has been with Chimo Shipping, a Canadian company specializing in heavy lifts and Northern Transportation, since 1966. He was formerly salesman, sales supervisor, then sales manager with Clarke Traffic Services Limited.

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G. E. McDowell, Western Regional Director, Air Services, Ministry of Transport, Edmonton. An electrical engineer, graduate of the University of British Columbia, he joined the Department of Transport in 1941 as a junior radio engineer. After some time with Ottawa Headquarters staff, he was transferred to Toronto where he was Regional Aids Engineer until he moved to Vancouver as Acting Regional Director, Air Services, in 1959. He was named Regional Director in Edmonton in 1961.

Jack Moar, Executive Director, Community Planning Association of Canada, Alberta Division, Edmonton. Graduated from McGill University in Mechanical Engineering; was a far northern bush pilot commencing 1924; in the oil business for 12 years.

Lionel R. Montpetit, Executive Vice-President, Northern Transportation Co. Ltd. He has been associated with a number of mining developments across Canada and has taken part in various projects with the building material industry in Ontario. In recent years he has served as special project manager and industrial investment analyst for the Denison Mines Organization, and acted as President of Eldorado Nuclear Limited in transportation matters, and was recently appointed to his present position.

R. A. Morrison, Vice-President, Transair Ltd. He did wire service, television and radio reporting before joining the Department of Transport as Executive Assistant to the Minister in 1965. He left

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in 1968 to take up his position with Transair. While working for the Transport Minister, he was closely involved in the formulation of the Regional Air Carrier policy, announced in 1966, and in the passage through Parliament of the National Transportation Act which established the Canadian Transport Commission as the federal regulatory agency over all modes of transportation in Canada.

J. K. Naysmith, Chief, Water, Forest and Lands Division, Department of Indian Affairs and Northern Development. He spent 12 years in the pulp and paper industry in eastern Canada and was Superintendent of woodlands for Abitibi Paper Company when he left in 1965 to join the Public Service as Administrator of Northern Forests. He was named to his present position in 1968. A graduate of the University of New Brunswick and Harvard University, with degrees in forestry engineering and forest economics, he was named a Charles Bullard Fellow by Harvard in 1967.

Abraham Okpik, Area Administrator, Government of the Northwest Territories. He is one of Canada's best-known Eskimos. Self-educated -- he went to school only to grade nine -- he was Councillor of the NWT from 1965-67. Subsequently he was named Director of Project Surname, a centennial project to eliminate the disc number system of identification for NWT Eskimos.

Robert J. "Bud" Orange, Member of Parliament for the Northwest Territories. Born in Ottawa and a B.A. graduate of the University

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of Toronto, he was an economist with the Department of Northern Affairs and National Resources when he became the Administrator of the Mackenzie District, NWT. He was first elected to the House of Commons in 1965 as Liberal member for the NWT and was re-elected in 1968. He served as parliamentary secretary to the Minister of Energy, Mines and Resources from 1968-70.

L. G. Pathy, executive vice-president, Federal Commerce & Navigation Co., Montreal. A graduate of Princeton University (B.A., 1956) and New York University (LL.B., 1960), he is a director of Federal Commerce & Navigation Co. and various subsidiary and associated companies, as well as a director of Pacific Inland Navigation Co. Inc., Seattle, and the Canadian Shipowners Association.

J. H. Parker, Deputy Commissioner of the Northwest Territories. A B.Sc. graduate in engineering from the University of Alberta, he has been working in the North since 1949. He practised geology and engineering in Uranium City, Saskatchewan and Yellowknife following graduation. From 1956 to 1964 he was engaged largely in mining exploration in the Yellowknife area, and in 1964 became President of and a partner in Precambrian Mining Services Limited, an engineering consulting and mining exploration service company with headquarters in Yellowknife. He was named to his present position in 1967.

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Kurt P. Peiffer, Vice-President, Traffic Development, Nordair. Born and educated in Munich, Germany, he came to Canada in 1951 and has worked in various phases of aviation since then. He was traffic and sales manager of Wheeler Airlines Ltd. when it was taken over by Nordair Ltd. in 1961. He left in 1964 to join deHavilland Aircraft of Canada Ltd. as manager of public relations and advertising, returned to Nordair in 1968, initially as Director of Traffic and Sales. While in Canada, he has studied commerce at Sir George Williams University in Montreal.

W. W. Phipps, President, Atlas Aviation Ltd., Resolute Bay, NWT. Born and educated in Ottawa, he served with the RCAF, European Theatre, Bomber Command, was shot down in 1943, taken prisoner, and honorably discharged in 1945. He has been engaged in civil aviation since 1946, and has been flying the Arctic regions since 1950. He was awarded the McKee Trophy in 1961, and formed Atlas Aviation at Resolute Bay in 1962.

Alex Pullin, President, Hall Corporation (Shipping) 1969 Ltd. Born and educated in Northern Ireland where he received his training in naval architecture, he joined Hall Corporation in 1954 after a number of years with Lloyd's Register of Shipping. He was elected to his present position in 1969. He is a member and ex-chairman of the Canadian Committee, Lloyd's Register of

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Shipping; President and General Manager of La Verendrye Line Ltd., Montreal; President and General Manager of Wincliffe Shipping Ltd., Montreal and Winnipeg; and Director of George Hall Corporation, Ogdensburg, New York.

D. M. Ripley, Director, Marine Hydraulics, Ministry of Transport. Born in Nova Scotia, he has a B.Sc. degree in civil engineering from Queen's University. He joined the Public Service in 1950 as an engineer in the Special Projects Division, Department of Transport; was appointed Chief Hydraulics Engineer with the St. Lawrence Seaway Authority in 1952; and in 1959 became Chief, Special Projects Division. He was appointed to his present position in 1964. He served in the Canadian Army from 1939-45, holding the rank of Major.

Commodore O.C.S. Robertson, Member of Northern Associates Registered 1967, a group of experts specializing in the study of Arctic environmental conditions. He retired from the Royal Canadian Navy in 1962, ending a naval career of more than 30 years. Among his commands was the HMCS Labrador, Arctic research and patrol vessel, which circumnavigated North America in 1954. During the period 1957-62 he was attached to the U. S. Navy for various periods on polar operations including Distant Early Warning Line. From 1964-67 he was on loan to Expo '67 as scientific advisor. He was on expeditions to Queen Elizabeth Islands in 1968-69, and to the Mackenzie River and Western Arctic in 1970.

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H. Basil Robinson, Deputy Minister, Indian Affairs and Northern Development. He was appointed to this position in 1969 after 24 years with the Department of External Affairs. Born in Vancouver, he is a B.A. graduate of the University of British Columbia, and a Rhodes Scholar, taking his M.A. in international politics at Oxford after the war. He served in the army from 1942-45, leaving with the rank of Captain in the Canadian Intelligence Corps. Returning to Ottawa in 1949, he was appointed to External's United Nations Division. He also had postings in London, Paris and Washington.

James Smith, Commissioner of the Yukon Territory. Born in New Westminster, B.C., he spent the first two years after high school as a butcher's apprentice and followed that trade in Atlin, B.C. for seven years. He spent nearly 20 years in Whitehorse as manager of a company involved in the food business and hotel and motel operations. A former president of the Whitehorse Board of Trade, he has also served as alderman for the City of Whitehorse, and was a councillor on the Yukon Legislative Council. He was appointed to his present position in 1966.

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Alex Stevenson, Chief, Northern Services Division, Department of Indian Affairs and Northern Development. He has been associated with the North for more than 30 years, first with the Hudson's Bay Company prior to RCAF service overseas, and then with what is now the Department of Indian Affairs and Northern Development. He was Administrator of the Arctic until administrative responsibility for the Eastern Arctic was transferred to the Government of the Northwest Territories. His division deals with such matters as Eskimo linguistics, art, vocational training and employment liaison with northern resource industries.

O. G. Stoner, Deputy Minister of Transport. Born and educated in Ontario, he served in the Canadian Army from 1941-45, leaving with the rank of Major. After completing university, he entered the Public Service in 1947 with the Department of External Affairs. He served in Paris and Brussels, and from 1959-64 was in charge of economic affairs in the Department. He was appointed Senior Assistant Secretary to the Cabinet in 1964; Acting Secretary to the Cabinet and Acting Clerk of the Privy Council, 1967-68; and Deputy Secretary to the Cabinet and Deputy Clerk of the Privy Council, 1968-69.

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A.H.G. Storrs, Director of Marine Operations, Ministry of Transport. He was Rear Admiral in the Royal Canadian Navy and Commandant of the National Defence College when he retired from the Navy in 1962 to join the Public Service. Born and educated in England, he served in the Royal Naval Reserve, and joined the Royal Canadian Naval Reserve in 1940 as Lieutenant Commander. He transferred to the RCN at the end of the war, and his appointments included command of the HMCS Nootka, the Naval Air Station, HMCS Shearwater and the aircraft carrier HMCS Magnificent.

J. W. Strath, President, Kenting Limited, Calgary. A former pilot in the RCAF from 1942-45, he was awarded the Distinguished Flying Cross. Educated at St. Michael's College and Loyola College, Montreal, he joined Spartan Air Services as pilot in 1953, later became Western Canadian manager for Spartan and Canadian Aero Services, and Executive Vice-President of Canadian Aero. He was President of Foothills Aviation and Klondike Helicopters before moving to Kenting Limited as General Manager in 1969.

Marvin P. Taylor, Vice-President, Operations, White Pass and Yukon Route. The key figure in his company's transportation operations, which spread over the Yukon and Alaska, he has worked in the North for 28 years. Born and educated in West Virginia, he joined the U.S. Army Transportation Corps in 1942 and was

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stationed at Whitehorse, Yukon, during the winter of 1942-43. He joined White Pass in 1948, was appointed general agent in 1953, assistant superintendent of the railway in 1957 and superintendent in 1960.

J. C. Underhill, Corporate Frontier Coordinator, Imperial Oil Limited. He has been associated with all phases of Imperial Oil's exploration activities in the Arctic since 1960, from field operations through to the exploration administration, and until recently was Regional Exploration Manager in Calgary. In his present position he is connected more with planning for the North than with operations.

Maxwell W. Ward, President and General Manager, Wardair Canada Ltd. Born and educated in Edmonton, he served as a flying officer in the RCAF from 1940-45 and upon discharge joined an aviation company. In 1946 he organized his own company, Polaris Charter Co. Ltd., which in 1948 was amalgamated with another to form Yellowknife Airways Ltd. He left in 1949 to enter the home construction business. Wardair Ltd. was organized in 1952, operating from Yellowknife. In 1961 the name was changed to Wardair Canada Ltd. for international service, and the company went public in 1967.

BIOGRAPHICAL SKETCHES

Donald N. Watson, President, Pacific Western Airlines Ltd.

Born and educated in Winnipeg he started in the aviation business as a mechanic in 1937, when he also learned to fly. During the war he helped organize an air observers' school and in 1945 joined Canadian Pacific Airlines. In 1946 he was one of those who started the Saskatchewan government air ambulance service. In 1949 he joined Ontario Central Airlines and was Managing Director until joining Pacific Western in 1958 as Assistant to the Vice-President and General Manager. He is a past chairman of the Board of Air Transport Association of Canada.

J. K. Welsby, Assistant Professor, Department of Transportation, Faculty of Commerce and Business Administration, University of British Columbia. A graduate of the University of Exeter, England, and the London School of Economics, with an M.Sc. in economics, he was Research Economist with the Electricity Council, London, from 1965-66; and Economic Advisor, Ministry of Transport, London from 1966-69. During that period he was also a part-time lecturer in the economics of transportation at the University of London.

B. F. Willson, President and Director, Canadian Bechtel Limited. A B.Sc. graduate in civil engineering from the University of Alberta, he served with the 13th Company Engineers Services and Works as Lieutenant from 1943-45, and began his career in 1945 as a distribution engineer with Northwestern Utilities Limited in

BIOGRAPHICAL SKETCHES

Edmonton. He served as President of that company and of Canadian Western Natural Gas Co. Ltd. in Calgary from 1962-65, and became President of Canadian Bechtel in 1965. He is a Vice-President of Bechtel Corporation, San Francisco, and a Director of International Utilities Corp., Toronto.

Dr. H. W. Woodward, Chief, Oil and Mineral Division, Northern Economic Development Branch, Department of Indian Affairs and Northern Development. A radio-navigator with the RCAF during the war, he graduated from Queen's University in 1949 with a B.Sc. degree and received his doctorate in petroleum geology from the University of Wisconsin in 1953. He joined Canadian Gulf Oil Company in 1953, and entered the Public Service in 1966 as Administrator of Oil and Gas of the Yukon and Northwest Territories, including the Canadian Arctic Islands. He was appointed to his present position in 1968.

K. L. Wyman, Economist, Research Division, Canadian Transport Commission. An M.A. graduate in economics of the University of Toronto, he worked in 1962-63 as a Research Assistant for two professors working on an official history of the Department of Trade and Commerce. From 1965-70 he was an Assistant Professor in the Department of Political Economy at the University of Toronto. In 1967 he did a research paper for the Task Force on Foreign Ownership, on the impact of foreign ownership on a selected group of Canadian industries.

APPENDIX "B"

LIST OF CONFERENCE
ATTENDEES

CONFERENCE DELEGATES AND CONTRIBUTORS

(* Registered but unable to attend)

ABERCROMBIE, R.J.	Mgr. Alta. Gas Trunk Line Co. Ltd., Calgary
ADAMS, WILLIE	President, Settlement Council, Rankin Inlet, NWT
ADLARD, R.P.	Traffic Supervisor, Amoco Canada Petroleum, Co. Ltd., Calgary
ALBERY, A.C.R.	Partner, Gibb, Alberly, Pullerits & Dickson, Don Mills
ALLAN, R.F.	Pres., Robert Allan Ltd., Vancouver
ANDERSON, J.M.	Engineer, St. Lawrence Seaway Authority, Montreal
ANDERSON, RAY	Gen. Mgr., Mid-Arctic Transportation, Inuvik
ANGUS, J.A.	R. Angus Ltd., Edmonton
ARCHER, M.	Vice Pres., Research, C.N.R., Montreal
ARMSTRONG, S.W.	Secretary, Scandia Trucking Ltd., Calgary
BAIN, DON	Vice Pres., Bain Bros. Construction (Div.) Edmonton
BAKER, A.	M.O.T., Ottawa
BAKER, K.J.	Dept. Highways & Public Works, Gov't of Yukon, Whitehorse
BALFOUR, J.E.	Mgr., Alcan Shipping Services Ltd., Montreal
BALLANTYNE, E.A.	Dir., Industry & Dev., Gov't of N.W.T. Yellowknife
BALLINGER, J.N.	Associate Dir., Marine Works, Ottawa
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BARRIE, A.J.	Superintendent Traffic N.W.T., Imp. Oil, Edmonton
BARRY, J.	R. Angus Ltd., Edmonton
BARTSCH, G.L.	Pres., Great Northern Airways Ltd., Calgary
BEKAR, C.F.	Pres., Ptarmigan Airways Ltd., Yellowknife
BENNETT, W.D.	Science Advisor, Science Council, Ottawa
BENUM, F.W.	Chief, Cdn. Meteorological Service, Toronto
BERG, B.	Hay River Chamber of Commerce
BRACUK, W.	Asst. Mgr., Canadian Telephone System
BRESE, W.	Bow Valley/Acres/Santa Fe Pomeroy Arctic Services, Calgary
BRIGHAM, S.K.	Asst. to the Pres., Cassiar Asbestos Corp., Toronto
BROCHU, M.M.	Dir., Centre de Recherches Arctiques, U. of Montreal Montreal
BRODSKY, C.	M.O.T., Ottawa
BRYNE, N.W.	Pres., N.W.T. Chamber of Mines, Yellowknife
BUCHANAN, H.O.	Reg. Dir., Marine Services, Vancouver
BUCHANAN, JUDD	M.P., Parl. Sec. to Min. IAND, Ottawa
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 CHARLETON, RAY Purchasing & Supply Officer, Territorial Gov't,
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 CLAUGHTON, D.H. Pres., Crown Caterers Co. Ltd., Edmonton
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 Island
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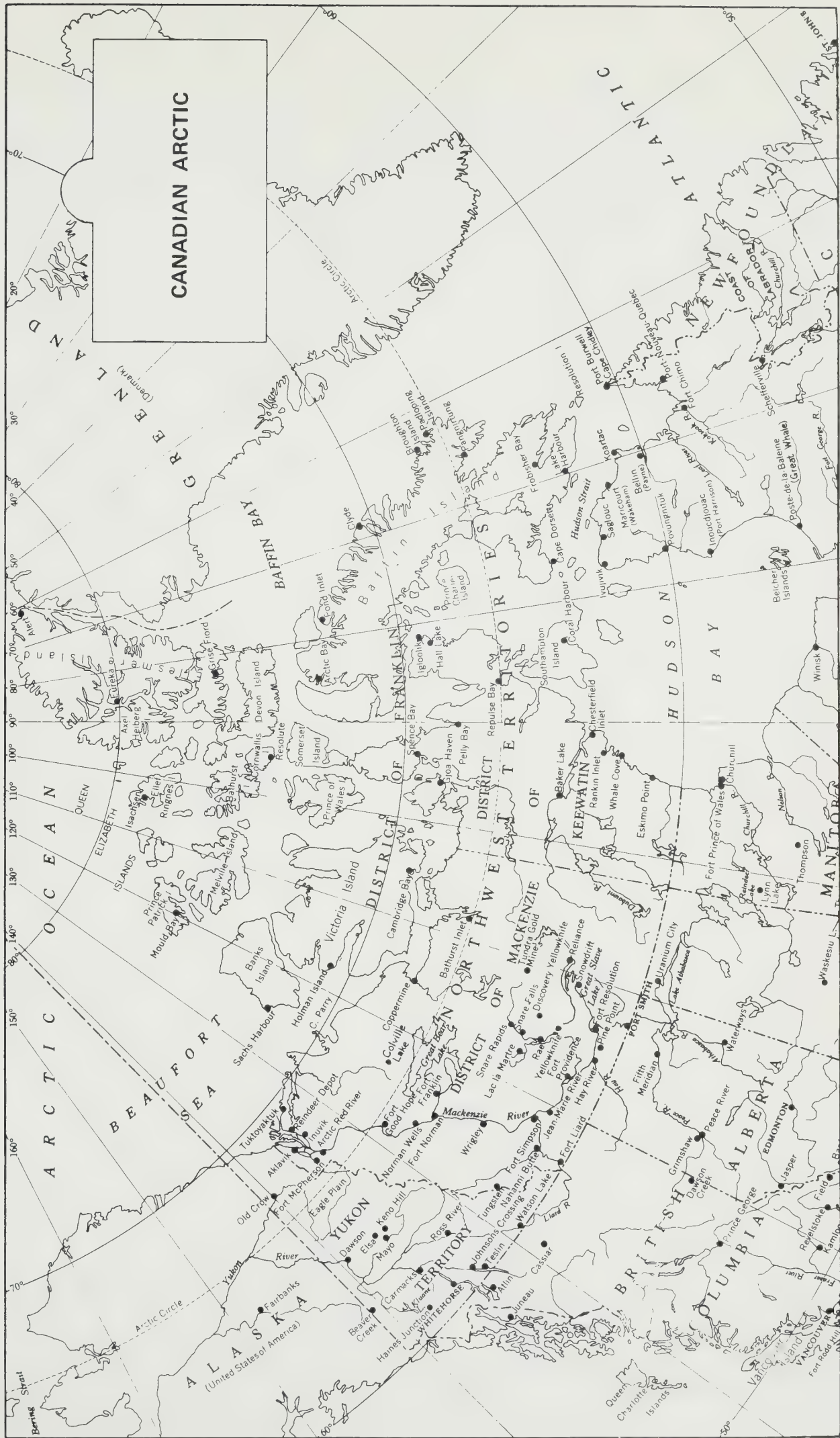
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ROSE, J.K.	District Mgr., Marine Services, Hay River
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STEWART, D.M.	Mayor of Hay River, N.W.T.
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WALTON, LT. COL.	W.I. D.N.D., Ottawa
WARD, D.S.	Past Pres., N.W.T. Aviation Council, Yellowknife
WARD, MAX	Pres., Wardair Can. Ltd., Edmonton
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WATSON, D.N.	President, Pacific Western Airlines, Vancouver
WATSYK, O.	Fort Simpson Hamlet Council, Fort Simpson, N.W.T.
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WOOD, J.C.	Fed. Prov. Relations Secretariat, P.C., Ottawa
WOODWARD, H.W.	Chief, Oil and Min. Div., Northern Economic Dev. Br. D.I.A.N.D., Ottawa



CANADIAN ARCTIC

Map of the Canadian Arctic region, showing the Arctic Ocean, Beaufort Sea, and various Canadian territories and provinces. The map includes geographical features like Baffin Bay, Hudson Bay, and the Arctic Circle. It also shows major cities, towns, and rivers, as well as the names of the territories and provinces: Yukon, Northwest Territories, Nunavut, British Columbia, Alberta, Saskatchewan, and Manitoba.



